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TROPICAL DISEASES BUREAU.

TROPICAL DISEASES
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Vol. 4.]

1914.

[No. 1.]

UNDULANT FEVER.

PATERSON (T. F.) & BROWN (H. C.). **Reflections and Proposals resulting from an Enquiry into the Causes of three Epidemics of Malta Fever occurring in the 37th Lancers and the 10th Lancers in India.**—*Proc. Second All-India Sanitary Conference. 1912. Vol. 3. pp. 300-310. (1913. Simla : Govt. Central Branch Press.)*

In this interesting paper a review is given of the prevalence of undulant fever throughout India during the last ten years, with a fairly full description of three recent small epidemics and the research work carried out relating to them. The report is founded on (1) 6 cases occurring among the 37th Lancers at Lahore, (2) 17 cases in the same regiment also at Lahore, with 2 deaths, (3) 24 cases in the 10th Lancers, 15 apparently infected at or near Delhi in December 1911, and 9 at Jullundur. Clinically three types of cases were found, severe and often fatal, moderate or undulant form, and mild, the latter generally producing very marked debility and neuritis. Infection was generally traced to the use of goats' milk; as horses were thought possibly to act as carriers, 350 were examined but with negative results. One cow belonging to a native officer appears, however, to have been infected. There was strong evidence that this animal played the part of a "carrier." Its serum reacted up to 1 in 400 and the milk whey to 1 in 30, but the micrococcus was not definitely isolated. This was the only animal, other than goats, out of a large number examined that could have supplied infected milk. For detection of "carriers" the serum and milk agglutination tests, with the isolation of the organism from the milk, are recommended, and for prevention the importance of the thorough sterilisation of all milk is strongly insisted upon, with the more general employment of the Ortol test* to prove

* Ortol Test for Milk—Solutions required :—

- (1) Ortol .05 grm.
Distilled water 5 cc.
- (2) Hydrogen Peroxide Solution.

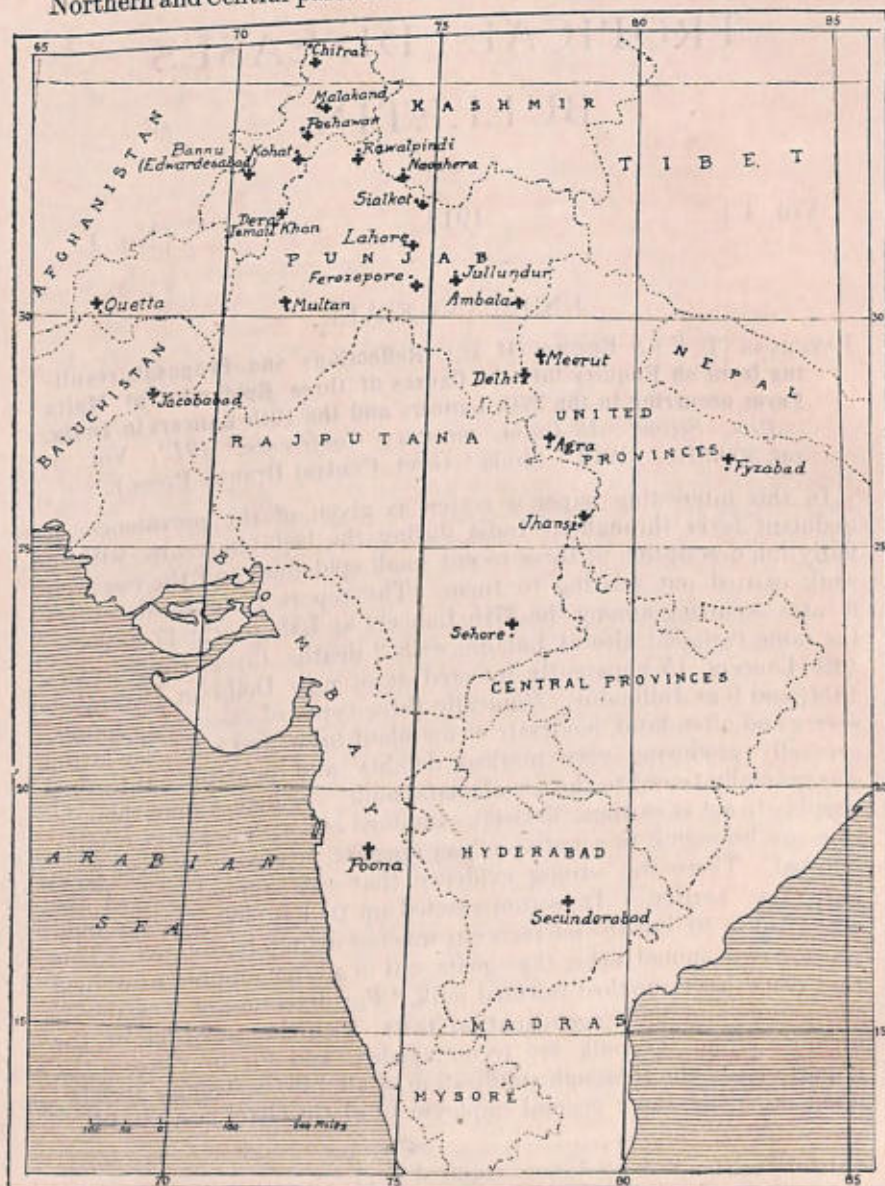
Add one drop of the Ortol Solution to a test tube half full of milk, shake and add one drop of Hydrogen Peroxide solution. If no pink colour is produced, the milk has already been heated above 75° C.

PATERSON and BROWN state that milk heated to 83° C. became pink, while milk heated to 93° C. kept its colour.

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that this has been done. A table is given showing the incidence of the disease in the Indian army from 1900. Since 1905 there has been a very large increase in the cases; the highest incidence was in 1907, 62 cases and 2 deaths. The fever is widely scattered throughout the Northern and Central parts of India. The number of cases in each place



Map showing Stations at which Undulant Fever occurred in the Indian Army from 1900 to 1911.

in many instances is given, but the prevalence differs very markedly from year to year. Several other tables are annexed showing the results of the agglutination reactions etc. of horses, cows, buffaloes

and goats. In testing the milk for agglutination, whey was employed, and the authors state that it is important to use the minimum amount of rennet, as an excess has a restraining influence on agglutination. They found one volume of Crosse and Blackwell's essence of rennet to 60 volumes of milk gave the best results.

P. W. Bassett-Smith.

DELLA VIDA (M. Levi). *Aleune Osservazioni sopra un Epidemia di Febbre Mediterranea in un Comune della Provincia di Roma.—Malaria e Malat. d. Paesi Caldi.* 1914. Mar.-Apr. Vol. 5. No. 2. pp. 105-120. With a plan and 2 figs.

In this paper the author describes again an epidemic of undulant fever in the province of Rome, an account of which was published in the *Annali d'Igiene Sperimentale* (see this *Bulletin*, Vol. 3, p. 212). Here however the etiology, methods of diagnosis, and treatment are more fully discussed, and he emphasises the great value of serum reactions for diagnosis, the spread of infection by other means than ingestion of infected milk, the great value of treatment by means of vaccines of the *M. melitensis*, and the necessity of legislation for stamping out the disease.

P. W. B.-S.

GATTO (Alfredo). *Sulla Febbre di Malta e sulla Febbre dei Tre Giorni a Scilla (Calabria).*—*Malaria e Malat. d. Paesi Caldi.* 1914. Mar.-Apr. Vol. 5. No. 2. pp. 121-123.

(1) The presence of undulant fever has been frequently noted in Sicily during the last three years. GABBI demonstrated by bacteriological and clinical methods the existence of the disease in Calabria, and differentiated it from typhoid, paratyphoid, tubercle and influenza. Many cases were described first as pseudo-typhoid. The incubation is said to range from 10 to 16 days, the onset is gradual, insomnia is common, followed by prolonged fever with joint and nerve pains and other symptoms usually found in the disease—but a roseola over chest and abdomen is mentioned which is not commonly seen. The fever generally commences in April and is present throughout the summer and autumn. The author, from his observations, believes that the infection is not always from ingestion of unboiled goats' milk, but may be conveyed by water and blood-sucking insects, such as culex and stomoxys. [No proof of this is given.]

(2) The existence of a short three-day fever, most commonly seen in September, is noted as occurring in epidemic form in Sicily. The symptoms are described in detail, but beyond the fact that in three cases a temporary albuminuria was noticed, they are of no special interest.

P. W. B.-S.

CANTANI (A.). *Sulla Flebite nella Febbre di Malta.—Policlinico.* Sez pratica. 1914. May 24. Vol. 21. No. 21. pp. 741-743.

The author draws attention to the occurrence of phlebitis during the course of undulant fever. The complication, he states, cannot be very uncommon, as two cases have occurred out of 141 in his own

clinic. The first was a woman aged 60; the thrombosis, affecting the right leg, came on after the fever had passed off. The second was also a woman, aged 39; the diagnosis of typhoid had been made and the thrombosis occurred during the fever, affecting the left leg. The sera when examined gave positive reactions for undulant fever and negative for typhoid and coli infections, the diagnosis being confirmed in both cases by positive cultures from the blood. Blood counts are given of the two cases, which show the usual signs of secondary anaemia and decrease in the relative number of the polymorphonuclear white cells.

[This complication would appear to be more common in women than in men, for the reviewer never had an instance in over 700 men treated at Haslar.]

P. W. B.-S.

CARNEIRO (M. Gonçalves). **A Febre de Malta no Rio Grande do Sul.**—*Rev. Med. de S. Paulo*. 1914. Feb. 28. Vol. 17. No. 4. pp. 56-64.

This is the first instance of undulant fever reported from Brazil. The author describes one case in detail and states that many similar ones have been observed, several from the same hotel in Cidreira. The symptoms were, prolonged fever of an undulatory character lasting two months, severe sweats, obstinate constipation, neuralgic pains and progressive debility, but there was no mortality. The diagnosis from typhoid and paratyphoid was at first difficult, and was not cleared up until the blood, being tested at the Oswaldo Cruz Institute, gave a definite agglutination with the *M. melitensis* up to 1-200, though blood cultures were negative. Goats' milk is extensively used. At the hotel cows' milk was supplied, but it is stated that goats' milk might possibly be mixed with this.

[An investigation as to whether the goats in the district are infected would be of very great value.]

P. W. B.-S.

BASSETT-SMITH (P.W.). **Recent Research relating to Undulant or Mediterranean Fever.**—*Trans. Soc. Trop. Med. & Hyg.* 1914. Feb. & Mar. Vol. 7. No. 4. pp. 127-153. With 6 charts.

The work done since the Commission of the Royal Society issued its final report in 1906 is first reviewed. The geographical distribution of the disease has now been much extended. Epidemiologically, the view that an infected milk supply is the chief source of infection is upheld by recent statistics. A diagram is given showing the incidence of undulant fever in the services after the use of infected milk had been stopped. The author points out, however, that other methods of infection are not uncommon, SÉJOURNANT stating that in urban areas the infection is generally through ingestion of infected milk, but in rural districts by direct infection or inoculation of infected soil or milk. People with cuts or abrasions on their hands who milk infected animals are liable.

Further work has been accomplished on the pathogenicity of the disease. EYRE and others have shown that besides monkeys and goats, horses, dogs, rabbits, guinea-pigs, rats and mice can be experimentally infected. Though the rabbit gives a serum having a high agglutinating

power, yet a true septicaemia does not appear, as the organism cannot be recovered from the circulating blood. The author used two rabbits and found that their serum reacted up to 1 in 2,000, but this agglutinating reaction was gradually lost, the animals making a complete recovery.

Mention is made of NÉGRE and RAYNAUD's discovery of the *M. paramelitensis* [see this *Bulletin*, Vol. 1, p. 75] and the author quotes a case of his own of this infection in the human subject [this *Bulletin*, Vol. 1, p. 579].

Methods of diagnosis, the author believes, must be separately considered for animals and man. The lacto-reaction of ZAMMIT and HORROCKS is the most ready and generally used method for detecting infected goats, but this should always be controlled by serum reactions or by other more certain methods.

An important observation mentioned is that in many infected goats there is a localisation of the organism producing a mammitis without general septicaemia. A series of observations for lacto-reactions of cows' milk obtained in London is next given [see below]. As regards diagnosis the following, in the order of their relative value, may be employed—

- (1) Sero-culture.
- (2) Agglutination.
- (3) Complement fixation.
- (4) Precipitin test.
- (5) Culture of the organism from the urine.

The difficulties of making a clinical diagnosis are constantly being brought forward owing to the irregular character of the symptoms, the long duration of the disease and the presence of certain abortive forms. This has been specially noted in country districts in Spain, Italy and Africa, and cases are frequently mis-diagnosed as typhoid, paratyphoid, and septic and gastro-intestinal infections.

SCORDO has obtained very good results by treating artificially infected goats with intravenous injections of perchloride of mercury. Such injections increased the corpuscular elements of the blood, raising the number of red cells and the haemoglobin and also producing a polymorphonuclear leucocytosis with sterilisation of the blood. This method may prove of value in human cases but apparently has not so far been reported. Vaccines may be used with good results, particularly in some acute cases both of *melitensis* and *paramelitensis* infection, and a series of charts showing examples of the rapid disappearance of the fever under vaccine therapy appears at the end of the paper. Clinically a general improvement, as shown by an increased feeling of comfort and a steady gain in weight, is often very marked in such cases, whilst the opsonic index is seen to rise at the same time. The author believes that a polyvalent vaccine made from many strains of the micrococcus might give better results and that the use of sensitised vaccines also requires trial.

Prophylactically, in endemic areas the disease should be made notifiable, local disinfectant methods should be carried out, the importation of infected goats should be stopped and regular examinations of animals by competent persons should be periodically made. Such measures have been taken in France and Algeria with good results. In conclusion the author believes that "we should recognise that though the disease has been practically eradicated from the naval

and military services, where protection of the food can be properly carried out, yet the disease is still rampant in very many endemic areas; also that the source of infection is by no means limited to ingestion of contaminated milk, but is frequently brought about by direct inoculation, particularly in rural districts, and that all cases, ambulant and otherwise, should be looked upon as potential carriers of the disease necessitating the thorough disinfection of excreta and contaminated articles."

The paper is illustrated with a map, a table and a series of charts.

G. C. Low.

CANTANI (Arnaldo). **Ulteriore Contributo sul Valore della Reazione Agglutinante per la Diagnosi della Febbre di Malta.**—*Malaria e Malat. d. Paesi Caldi*. 1914. Mar.-Apr. Vol. 5. No. 2. pp. 65-79.

This is a long and critical review of all the recent work bearing upon the diagnosis of undulant fever by agglutination methods. The contradictory results and the want of specific characters, as demonstrated by various experimenters, are mentioned and are well known. The presence of non-specific agglutinins in normal and abnormal bloods is described, and the value of heating the serum to cut out these. In the author's opinion, which agrees with that of RIMBAUD and others, heating the serum to 57° C. as recommended by NÉGRE and RAYNAUD not only does no good, but is positively harmful, the heated serum being much reduced in sensitiveness, bringing down a reaction of 1-3,000 to 1-200. [This is not found by all other observers.] The character of the organism, the media on which it is grown, the strength of the emulsion, the technique, time limit, and condition of the serum, vary so much in different laboratories that no general statistics can be relied upon—and these differences are the source of the marked irregularities obtained. It is a very definite fact that other organisms, as *B. typhosus*, *B. paratyphosus*, *Streptococcus*, *B. tuberculosis*, etc., may cause the presence of bodies which will agglutinate the *M. melitensis* (generally in low dilutions) and can be usually removed by absorption tests. The author, who has had eight years of both clinical and laboratory experience of fevers in Italy, in an examination of 630 cases found that 119 tubercular infections gave positive reactions with the *M. melitensis*. Out of these 630 he notifies 146 of undulant fever, or 23.17 per cent., the reaction varying from 1-50 to 1-5,000; the greatest number were between 1-200 and 1-500. He takes 1-50 as the minimum dilution that can be used with safety for diagnosis when all possible precautions are taken, though some with 1-25 may possibly be true infections; a dilution of 1-100 giving a positive reaction is more conclusive. He strongly insists upon young 24-hour cultures being used and that the emulsion shall not be too strong, the growth of one tube in 7-8 cc., not in 1 cc. of normal saline as often used; with a maximum time limit of 24 hours for the microscopic test. All reactions must be well controlled, and all sera reacting in low dilutions should also be tested for agglutination with other specific organisms, tuberculin and Wassermann reactions being carried out and leucocyte counts made. It is also important with reactions in low dilutions to repeat the test. The higher the reaction obtained the greater the reliability, but the author does not consider

the agglutination test to be absolutely specific, a blood culture being required to clinch the diagnosis. Many errors are made by calling strange fevers *melitensis* infections on unreliable data.

[The paper is very full of information and references are given to the authors quoted.]

P. W. B.-S.

BASSETT-SMITH (P. W.). **The Agglutination of *M. melitensis* by normal Cows' Milk.**—*Lancet*. 1914. Mar. 14. pp. 737-739.

KENNEDY noted that the milk from cows in London is in some cases able to cause agglutination of the *M. melitensis*. He obtained a positive reaction with the milk of three out of 22 cows and five times from mixed milks. The reaction was lost by filtering the milk through a Berkefeld or Doulton filter (see this *Bulletin*, Vol. 3, p. 214).

Bassett-Smith believes that there has been some error of technique in getting these results because such cows are certainly not suffering from undulant fever. He therefore tested a number of milks, in some of which he obtained unexpected reactions. He found "that boiling the milk cut out all the reactions; that heating it to 60° C. for half an hour cut out some, but not all. That with unheated milk of 37 individual cows—tested with equal parts of emulsion made with normal saline solution—3 reacted in half an hour, 6 in one hour, and 6 by sedimentation; these were reduced to 2, 4, and 5 by heating the milk." In dilution of 1 in 20 of milk direct from the 21 cows he did not get any positive reactions either microscopically in one hour or by sedimentation with heated or unheated samples."

Five samples from cows which had given reactions in low dilutions were plated out for isolation of the *M. melitensis* but without success. He concludes that "there is no doubt that cow's milk in some cases has a natural tendency to agglutinate the *M. melitensis*, but if care is taken most of these non-specific reactions may be avoided. The reaction always requires to be controlled by other methods of diagnosis before an animal can be considered to be infected.

Two tables giving the results of the observations are inserted in the text.

G. C. L.

SPRUE.

BAHR (P. H.). **Researches on Sprue.**—*Trans. Soc. Trop. Med. & Hyg.* 1914. Apr. Vol. 7. No. 4. pp. 161-182. With 8 figs.

This paper is one of the most important contributions to the knowledge of sprue that has appeared of late years.

After touching on the physical and climatic features of Ceylon, where the cases were observed, the author gives the general geographical distribution of sprue, drawing attention to cases that have been reported as originating in Holland and Germany. Passing to the distribution of the disease in Ceylon, he concludes that there is no striking preponderance in any locality. The next point raised is the occurrence of the disease amongst the natives, and the author has collected some eleven cases which include members of all the main native races inhabiting the island. Amongst the Burghers also 8 cases were seen, and 5 out of the 36 cases observed in Europeans were individuals who had been born in and had never left the island. Of the 36 European patients 19 were females and, when it is noted that the proportion of European males to females is as 2 to 1, it must be admitted that the disease is much more common in females than in males.

Passing on to environment and diseases predisposing to sprue, the author could find no evidence to uphold the popular belief that the disease is connected either with the so-called "dry-rot bungalows" or with previous attacks of dysentery.

With regard to the infectivity of the disease the author's conclusions are that its occurrence in persons closely associated with one another was far too frequent to be accidental.

Dealing with the symptoms, the author classifies the disease under two headings, "complete" and "incomplete"; the former including those cases where all the classical symptoms were present, the latter those in which some of the usual symptoms, such as diarrhoea or the typical tongue lesions, were the only manifestations.

Investigating various points which are classed under the heading of clinical pathology, the author states with regard to the colour of the stools that the bile pigments must be altered during their passage through the intestines, as bile of normal colour was always found in the gall bladder post mortem. The reaction of the stools was invariably acid and this acidity was probably due to lactic or butyric, not to hydrochloric acid. Trypsin was absent from the stools. Examination of the urine revealed nothing of importance. The saliva was always acid when tongue lesions were present. Anaemia was not generally a marked feature and as a rule no histological abnormalities were noted in the blood.

With regard to the post mortem findings the first point noted is that the internal organs, liver, spleen, etc. were wasted proportionately to the total body weight. The intestinal mucous membrane was covered from the duodenum downwards with a film of ropy mucus, but no ulceration was observed. The tongue was coated with thrush and the oesophagus with a yellowish substance resembling diphtheric membranes.

On section the stomach was found to be normal; the remainder of the intestinal tract showed chronic inflammatory changes. The membrane covering the oesophagus was composed of yeast-like fungi, and mycelial threads were observed penetrating into the tissues both in the oesophagus and the tongue. In sections of the spleen, certain of the endothelial cells, which were much swollen and degenerated, contained bodies of small size staining pink with Giemsa's stain and retaining Gram's stain, which are in the author's opinion peculiar to sprue and are of a degenerative nature.

Dealing with the etiology of sprue the author, after referring to CASTELLANI's kaleidoscope-like views, discusses the possibility of yeast-like organisms being the cause of the disease and after giving the percentage of positive findings and cultures of such organisms in sprue cases, in cases of other diseases, and in normal individuals, sums up the evidence for and against sprue being a disease due to blastomycotic infection and concludes his paper with a list of the principal points elucidated in his researches, which are given verbatim below:—

“Evidence in favour of regarding Sprue as a blastomycotic infection.

“1. Yeast cells and mycelial elements are found intracellularly in scrapings of the tongue lesions at an early stage of the disease, but cannot be found at a later stage in scrapings of the same structure when inflammatory symptoms have subsided.

“2. Yeasts are the only organisms found in the deep layers of the tongue in microscopical sections; the evidence that this infection is not one of recent date received support from the chronic inflammatory changes in the corium of the papillae, and from the presence of Russell's bodies in this situation.

“3. The desquamation of the epithelial cells, accompanied by sub-acute inflammation of the tongue and of the oesophagus, are changes such as would be expected from a study of the mode of growth of the thrush fungus and of its low order of virulence.

“4. A general infection of the intestinal mucus with yeasts was found in sprue post-mortems, but no such a general infection in twenty-six cases of other chronic wasting diarrhoeas.

“5. The stools of sprue, their frothy and gaseous character, are such as one would expect in a blastomycotic infection of the intestinal canal.

“6. The relapsing nature, the chronicity and latency of the disease, are compatible with what is known of the life history of the blastomyces, their periods of attenuated growth and powers of sudden recrudescence.

“7. There is no evidence in favour of regarding the sprue yeast fungus as being otherwise than identical with the thrush fungus (*Monilia albicans*), an organism possessing a very low pathogenic power, but it is possible that under certain conditions, as for instance in the tropics, this power may be greatly augmented. In support of this view I may add that it is a well-recognised fact that there are numerous varieties of yeasts employed in brewing beer and in making wine, and the predominance of one variety in certain districts imparts to local wine its characteristic flavour, which, though differing widely from each other in their powers of growth and fermentation, yet resemble each other minutely in their morphological and cultural characters. May it not be that their pathogenic, as well as their other properties, are capable of being influenced by local conditions?

“8. Wasting and anaemia, both symptoms of sprue, can be produced by continuous intravenous injections of small doses of broth cultures of a pathogenic yeast; moreover a degeneration of the hepatic capillary endothelium, apparently similar to that found in the sprue spleen, may be produced in these animals by the same means.

“9. Diarrhoea, atrophy of the lingual papillae as in sprue, digestive disturbances, and an aphthous ulceration of the mouth are commonly found in infants, the subjects of thrush infections in temperate zones.

"10. It is possible that obscure diseases of the alimentary canal in children in temperate zones, such as GEE'S coeliac diarrhoea, are of the same nature as sprue in adults in the tropics. A hypothesis of this sort would explain the occurrence of sporadic cases of sprue in temperate zones.

"11. The local affection of different portions of the digestive tract with this fungus would best explain the varying clinical manifestations of sprue.

"12. To maintain such a hypothesis it is necessary to stipulate for a third factor, a predisposing cause, which may exist in the local tropical climatic conditions, which favour a more precocious and luxuriant growth of all fungi, a matter of common observation to all laboratory workers in the tropics.

Evidence against regarding sprue as a blastomycotic infection.

"1. The thrush fungus (*Monilia albicans*) is a terminal, though uncommon, infection in other chronic wasting diseases, such as phthisis, cancer, diabetes, etc.

"2. General infections of the alimentary canal with this fungus have been reported in temperate zones.

"3. If the geographical distribution of sprue be eventually found to correspond with that of other typical tropical diseases, such a fact alone is in favour of a protozoal, rather than of a fungoid or bacterial, origin of the disease.

CONCLUSIONS.

"Finally, as a result of my work, I submit the following conclusions for consideration:—

"1. Sprue is a specific disease of tropical and sub-tropical countries, though it is possible that cases occasionally originate in temperate zones.

"2. It is a disease prevalent in Ceylon, especially amongst the Europeans, but contrary to the opinion hitherto held, it may also occur in the native, irrespective of race or mode of life.

"3. This fact, together with the occurrence of the disease in people closely associated, suggests a local influence or some communication from man to man.

"4. Sprue is a variable disease; it may occur in a mild or in a particularly virulent form, and in common with many other serious diseases, it is sometimes liable to sudden remissions and latent periods.

"5. There is evidence that the disease may occur as distinct and specific clinical forms according to the portion of the alimentary canal attacked.

"6. Researches on the composition of the stools point either to a complete absence or inefficiency of the intestinal digestive ferments.

"7. Researches on the blood and urine are in favour of regarding sprue as an alimentary toxæmia.

"8. The pathological findings are also in favour of this supposition and point to an infection with the thrush fungus (*Monilia albicans*) as being the organism concerned in its production; the balance of evidence I have collected I consider is, on the whole, in favour of rather than opposed to this view."

S. R. Douglas.

JUSTI (Karl). *Beiträge zur Kenntnis der Spru (Aphthae tropicæ).*
[A Contribution to our Knowledge of Sprue.]—*Beihefte z. Arch.
f. Schiffs- u. Trop.-Hyg.* 1913. Dec. Vol. 17. Beiheft 10.
pp. 5-53. [pp. 519-567.] With 1 plate.

In the summer of 1909, when residing in Hong Kong, the author had the opportunity of making a post mortem examination of a case of sprue under particularly favourable circumstances. Immediately after death, injections of a 4 per cent. formalin solution were made into different regions of the abdomen, as recommended by FABER, and

the autopsy was commenced ten minutes afterwards. In this way, in the portions of the alimentary canal to which the solution had gained access, the mucous membrane was sufficiently preserved to permit of detailed microscopic examination. The material so obtained was sent home to Professor BENEKE, who communicated the results of his histological examination to the meeting of the German Pathological Congress in 1910 (*Zentralbl. f. allg. Path. u. path. Anat.* Bd. 21. Heft. 10), while the author now provides the clinical history of the case and the remaining notes of the autopsy.

The most interesting part of Professor BENEKE's examination of the organs submitted to him was the discovery of rod-like bacteria, both free and enclosed in phagocytes, in the mucous membrane of the tongue, oesophagus, stomach and small and large intestine, and the author regards these bacteria as the true cause of sprue. He considers that the small intestine is the primary seat of the disease in sprue, the epithelium of the villi being invaded by the bacteria in question. The aphthous condition of the mouth and other parts he regards as a supplementary infection, due merely to the progress of the cachexia. For the arguments by which the author supports this thesis reference should be made to the actual paper. The plate gives illustrations of the bacteria discovered.

S. R. D.

Low (George C.). **Arthritis in Sprue.**—*Jl. Trop. Med. & Hyg.* 1914. Jan. 1. Vol. 17. No. 1. pp. 1-2.

The patient, a man aged 43, had resided over 18 years in India. He had had a mild dysenteric diarrhoea once, but not recently. The sprue condition came on insidiously. He was seen in July, 1912, when the stools were of typical sprue character. A strict milk diet was prescribed and the patient improved. In October there was a relapse and in the summer of 1913 another well-marked relapse, since which the condition has not altered much. In May, 1913, slight pains resembling rheumatism began in the right shoulder joint. By November these had increased and the movements of the joint were limited. A surgeon diagnosed adhesions in the shoulder joint due to septic absorption from the intestine. Chloroform was given and the adhesions were broken down. The author writes:—

"It is not perhaps quite correct to term the lesion of the patient's shoulder-joint a pure arthritis, because as far as one can judge the internal arrangements are still in good working order. The changes that have developed would appear to be in the fibrous tissues about and around the joint, namely, in the capsular tissues, and the tendon-sheaths of the different muscles. In these there would seem to have been inflammatory changes of a subacute or chronic nature resulting in the formation of adhesions with a strong tendency to go on increasing and to become progressively worse."

Later, however, slight grating within the joint was noticed, evidently indicating some involvement of the cartilages. The author writes that he has neither seen nor read of a previous case of the kind. He thinks the arthritis must be connected in some way with the sprue, as other possible causes were excluded.

A. G. B.

SCHMITTER (Ferdinand). Sprue treated by Emetine Hydrochloride.—
Military Surgeon. 1914. Apr. Vol. 34. No. 4. pp. 330-331.

The author, having observed a case of sprue with *E. histolytica* in the stools to show marked improvement when treated with emetine, decided to try the effect of this drug in uncomplicated cases of sprue.

Six cases in all were treated and all showed improvement. A disadvantageous effect of the administration of the drug was a temporary increase in the activity of the intestines, but this the author states was trivial in comparison with the general improvement.

S. R. D.

WERNER (H.). Skorbutsymptome durch einseitige Ernährung mit Haferschleimsuppen bei Sprue. [Symptoms of Scurvy occurring in a Case of Sprue nourished exclusively on Oatmeal Gruel].—
Arch. f. Schiff- u. Trop.-Hyg. 1914. Apr. Vol. 18. No. 7. p. 252.

The author gives a brief account of a patient, a sea captain aged 57 years, who was treated for sprue, contracted in the tropics, in the Hamburg Seamen's Hospital. The only diet that did not cause intractable diarrhoea was oatmeal gruel. On this the motions became solid, but unfortunately after a week petechiae of a scorbutic character began to appear on the legs. The gruel having been changed for a mixed diet the petechiae disappeared. The patient eventually died of the progress of the disease.

S. R. D.

PLAGUE.

Low (R. Bruce). **Report on the Progress and Diffusion of Plague throughout the World during the two years 1911 and 1912.**—*Forty-Second Ann. Report of the Local Govt. Board, 1912-1913.*—Supplement containing Report of Medical Officer for 1912-1913. Appendix A. No. I. pp. 1-88. 1914. London: Printed under the Authority of H.M. Stationery Office. [Cd. 7181.]

This exceedingly valuable report is itself a summary so condensed that it is impossible to do more here than indicate the nature of its contents. It brings together into one small and convenient pamphlet notices of all the outbreaks of plague recorded during the years 1911-1912, arranging them under the headings of their different countries and where necessary subdividing the countries into provinces and districts. But it is much more than a mere record of figures of cases and mortality, summarising critically also the measures taken to meet the disease and their results in each area, as well as the opinions offered by the local investigators on the origins, transmission, progress, treatment, prophylaxis, etc., of the disease. India naturally occupies a large part of the Report, but not disproportionately, and it is satisfactory to see that, where there is reason to believe in the existence of plague, in spite of the absence of official notification (e.g., the Canary Islands, the Argentine), the fact receives due notice.

J. Henderson Smith.

BROWNING-SMITH (S.). **The Annual Reappearance of Plague.**—*Proc. Second All-India Sanitary Conference, 1912.* Vol. 3. pp. 17-47. With 3 maps. (1913. Simla: Govt. Central Branch Press.)

In a paper published in 1910 Browning-Smith argued from the facts of the plague season in the latter half of 1908 that in the Punjab the annual recurrence of the disease had its origins, not in the few places where plague recognisably lingered on into or through the preceding off-season, i.e., the summer, but developed afresh without reimportation in places where there had been an interval of apparent freedom from the disease in man or rat. In 1911 the increase of plague in the autumn was less than usual and it was possible to make a detailed investigation of all plague appearances between 1st August and 15th December with the object of determining to what extent places in which the infection had demonstrably persisted through the summer either in rats or man were responsible for the recrudescence in the province.

Excluding sporadic cases which did not lead to epidemics and excluding also epidemics demonstrably due to importation from outside the province, the plague outbreaks during the autumn of 1911 can be divided into 2 groups. The first of these comprises the epidemics, 7 in number, which were derived from places where the disease had persisted through the preceding off-season. There were three of these persistent centres, one of them the large town of Rawalpindi where an active epidemic was in progress showing human cases in every week but one from May to 15th December; and from these 3 centres 4 secondary epidemics were started by importation. The second group comprises the epidemics not connected with these centres

and not due to fresh importation, so far as could be ascertained. Of these there were 38 and they gave rise by importation to other 11 secondary epidemics, in all 49. The epidemics of this second group developed after an interval of apparent freedom in places situated in all parts of the province and they arose almost simultaneously in October and November, each infection being slight in itself and apparently unconnected with one another or with the three persistent centres.

It would appear, then, that, so far at least as the Punjab is concerned, the annual recurrence of plague is due much less to those places where it has perceptibly carried over through the off-season than to a fresh reappearance in those places where it had, so far as outward signs showed, died out. This recrudescence is not due to importation, and the most reasonable available explanation of the invisible persistence of the disease is that an epizootic of plague continues below ground, progressing slowly during the off-season, possibly owing to a scarcity of fleas [or of fleas in the most infective state] and quickening up with a return of conditions suitable to flea transmission. The infection of which the autumn development is a continuation may have been marked by a complete epidemic in the preceding season, going on to the exhaustion of the susceptible rat-population, or an incomplete epidemic which the arrival of the hot weather has cut short before rat exhaustion is accomplished. It may have been characterised by rat-mortality only, or there may have been only an imported case without any evidence at the time of infection having occurred locally. There may even have been no evidence of importation, though such has occurred. The factors determining the local reappearance are probably extremely complex. "One is certainly the condition of the rat-population, for plague rarely appears in the autumn in a locality which has suffered a complete epidemic in the beginning of the year."

Importation is no doubt of the utmost importance in the spread of the disease once it has appeared, and complete control of importation would reduce the development enormously. But the really important origin of the annual recurrence is this reappearance without fresh importation, and in the Punjab the primary objective of the plague department has been to attack the origins of the epidemics. For this there has been only one measure available, because in the absence of actual plague it is the only one the people would accept, viz., rat-destruction. And from what has been said it is evident that such a measure must be applied not only to places where the disease has lingered on over the off-season, but far more extensively and systematically, as has been the practice in the Punjab. The paper is accompanied by maps and tables illustrating and supporting the conclusions above summarised and supplying instances of the reappearance of plague after different forms of infection in the preceding season.

J. H. S.

TURKHUD (D. A.). Defective Registration of Plague Deaths, an Explanation for the Reappearance of Plague without Evidence of Importation of Infection.—*Proc. Second All-India Sanitary Conference, 1912.* Vol. 3. pp. 62-68. (1913. Simla: Govt. Central Branch Press.)

Among the results of a special investigation undertaken in 1908-1910

in the Satara district of Bombay Presidency it transpired clearly that the official plague register is an unreliable index, not only of the number of cases but also of the date of the appearance of the disease in this district. A register of deaths is compiled by the village officers, who are not medically trained, and except in the case of suspected crime no attempt is made to verify the diagnosis or cause of death which is reported to them. At the beginning of an epidemic the disease is frequently unrecognised, but even when recognised the native officer frequently deliberately returns it as "fever," asthma, diarrhoea or some other condition, in order to avoid the trouble which notification of plague brings with it to the village and to the officer himself. Such cases therefore do not appear as plague in the Register of Deaths nor in the special Plague Register, and it is not till the increasing number of cases makes further concealment impossible that notification is made and the registers correctly filled. Turkhud gives various specific instances in which it was discovered on detailed enquiry that unrecorded plague deaths had preceded the first recorded case, and he also gives briefly the results of an investigation where steps were taken to obtain accurate information. This showed that in every case in which a village developed plague, infection could be traced to another village and that no outbreak within the area under examination could be attributed to a recrudescence of the disease without importation. During the off-season each year only one village—and that a different one each year—remained infected, and this village was the source from which all the other villages became infected in each epidemic. If the data had been compiled in the manner of the official registers the early cases would have passed unrecorded, the evidence of importation would have been lost, and the outbreak have appeared as a recrudescence of local latent disease and not as an instance of imported infection.

J. H. S.

KUNHARDT (J. C. G.). The Importance of the Persistence of Plague Infection in certain Villages during the Off-season.—*Proc. Second All-India Sanitary Conference, 1912.* Vol. 3. pp. 48–61. With 3 charts. (1913. Simla: Govt. Central Branch Press.)

Kunhardt has constructed a table or chart for the years 1899–1904 in which is shown the plague cases returned month by month in certain villages and towns of the Poona district. The plague season in this district lasts from July to the end of March, the off-season occurring in the three remaining months, and the chart includes all villages which have returned plague cases in the first 3 months of the plague season as well as in any of the preceding 6 months. The villages so selected include only a small fraction of all the villages infected in Poona district during the years in question, but they are taken as including all or nearly all the villages which carried plague from one season over the off-season into the next. From this chart it appears that, excluding Poona city and its immediate environment, only 17 villages out of the whole number carried plague over the off-season in these six years, and that unless it does so carry over it is rare for the same village to be infected in two successive seasons. No individual village carried over in more than one year, and there is no reason therefore to look

on plague as endemic in Poona district, except possibly in Poona city. In every case of apparent exception to this rule there are present special circumstances, such as nearness to Poona city, exceptional communications and so on, which render them specially liable to importation of infection from outside. Common to these 17 villages is the fact that in the years they carried over they were all infected late in the preceding plague season. If infection occurs early in a season, the epidemic runs its course and dies out before the arrival of the off-season; but when a village is infected late in the season, the disease is liable to linger through the off-season and reappear next season. Poona city with its suburbs certainly carried over in some seasons, and possibly did so in all. In a large town epidemics take longer to run their course, but it is difficult owing to the extent of the trade-communications to ascertain definitely whether the persistence of the disease may not be due as much to repeated importation as to continuance of the local epidemic. Kunhardt suggests that it is possible to determine beforehand the villages likely to carry over and to take special precautions against its recrudescence in these, which are few enough to permit of thorough treatment. [No data are given which would allow even a rough estimate to be formed of the proportion of the total plague in the district each year which is due to subsequent extension from the villages in which it has carried over the off-season, nor whether plague arising in the fourth or later months of a season is always due to importation—cf. TURKHUDD above.]

J. H. S.

TAYLOR (J.). *Plague in the Madras Presidency.*—*Proc. Second All-India Sanitary Conference, 1912.* Vol. 3. pp. 80-87. (1913. Simla: Govt. Central Branch Press.)

This paper summarises briefly the results of a long series of investigations into plague in the Madras Presidency. The Presidency may be divided into five main areas according to physical conditions. The first of these is the long strip between the East Coast on the one hand and on the other the range of hills formed in the North by the Eastern Ghats and further South by the united Eastern and Western Ghats. This extensive area lies low, has no well-marked cold weather except in the Northern parts, and it has almost entirely escaped plague. The second area comprises the parts of the central district sloping up to the Mysore plateau which lie above the 1,000 feet level. Here plague is as a rule slight, but there have been several severe, usually isolated, outbreaks in some of the larger municipalities. The cold season is longer than in the first area, especially in Coimbatore. The third area lies between the Eastern and Western Ghats, and may be subdivided into 2 parts. Of these the more southerly is the Mysore plateau and the adjoining parts of the Presidency above 3,000 feet, with a long period of moderate temperature and no severe hot weather: here plague is practically endemic. The more northerly portion of this third area has an elevation of about 1,500 feet, and includes Bellary district. The annual variation of mean temperature is from 73°-94°, the hot weather being very severe but the cold season lasting three months. Here plague has been inconstant but of exceptional severity, the epidemics in Bellary district accounting in some years for nearly

half the plague deaths in the Presidency. The fourth area is the strip between the Western Ghats with an equable temperature, neither very hot nor very cold; it has had very little plague except in four seaports, including Mangalore where it has persisted without being severe since 1902. Lastly, the fifth area is the Nilgiri plateau over 6,000 feet, with a climate rather temperate than tropical, and a persistent plague infection not accounting for many deaths in all, but causing a higher percentage mortality in the population than in any district except Bellary.

On the whole there would seem to be a certain correlation between the climatic conditions and the incidence of plague in the Presidency. But plague is responsible for relatively few deaths in Madras. Outside Bellary district and the small elevated area next the Mysore plateau it has reached noteworthy epidemic proportions in only a few large towns, and apart from these would be of less importance as a cause of mortality than simple diseases such as bronchitis. The exceptional severity of the disease in Bellary cannot be explained by the nature of its climate alone. Adjoining districts with much the same climate do not suffer to nearly the same degree, and Taylor suggests that its proximity to infected parts of Bombay Presidency may be responsible for its liability to infection.

Observations were also made on the flea prevalence in different parts of the Presidency throughout an entire year. It appears from these that the longest period of high flea prevalence occurs in the highest and coolest places, in the area where plague is endemic, and the lowest flea count was made in the low-lying hotter areas which have escaped plague, and intermediate counts were obtained in places occupying an intermediate position with regard to elevation, temperature and plague.

J. H. S.

WHITE (F. Norman). Grain and the Grain Trade considered as Factors in the Persistence and Dissemination of Plague in India.—*Proc. Second All-India Sanitary Conference, 1912.* Vol. 3. pp. 72-79. (1913. Silma: Govt. Central Branch Press.)

The importation of plague has been repeatedly ascribed to the importation of grain, and White points out two or three recent instances where the grain was supposed to be responsible for its introduction to a fresh district. He is himself of opinion that the carriage of infected rats or fleas in grain is of an importance second to none in spreading the disease, and finds some confirmation of this view in certain broad facts in the history of epidemics in the United Provinces and India generally. The United Provinces were first infected from the Bengal district of Saran, the disease appearing in January 1901 in Raniganj in the Ballia district, in a house adjoining the shop of a grain dealer, and its rapid spread from Raniganj through the province was attributed at the time to the fact that this town was a large grain mart supplying numerous villages. Plague reappeared in 1901-1902, almost entirely confined to the Benares division and Allahabad district. The infection came most probably from Bengal, and trade returns show that of the grain imported into the United Provinces from Bengal over nine-tenths went to the Benares division and a large part of the remainder

to the Allahabad district. Again, if the trade blocks in the West of the United Provinces be arranged on the one hand in the order of size of their grain imports (reckoned per head of population) and on the other in the order of their plague death-rate, it is found that the order in the two lists is the same. Banda Town, again, has had a remarkable immunity from plague, and it imports practically no grain. Jhansi, again, imports its grain chiefly from Bhopal and Gwalior, and the years in which it suffered from epidemic plague were also years of epidemic plague in Bhopal. Against this view is the well-known fact that plague is usually less severe in years of famine and scarcity, although these are years of increased grain-importation, but this might be due to a reduced rat-population in years of scarcity.

It is reasonable to suppose that plague should have some association with grain, whether largely transmitted in it or not. Grain stores are favourite resorts of rats, e.g. White found in Belgaum during the epidemic that rats were more plentiful in grain go-downs and the Market than elsewhere (he also found a higher percentage of infection in the rats caught there than in those caught elsewhere) and the epizootic once started amongst them would have greater chances of spreading and persisting. The method of storage is therefore of importance, and a brief summary is given of the results of an enquiry into the methods in use in the United Provinces, from which it would appear that there is a marked freedom from rats when the grain is stored in pits (possibly owing to the heat generated inside the pits).

J. H. S.

CASTELLANI (Aldo) & PHILIP (Marshall). *Plague in Ceylon*.—*Brit. Med. Jl.* 1914. Apr. 4. pp. 752-753.

No indigenous cases of plague have hitherto been known to occur in Ceylon, but in January of this year it appeared for the first time and had caused 48 cases at the time of writing this paper. The disease has been of an extremely virulent form, death occurring usually within 48 hours, and has taken a septicaemic type without enlargement of lymphatic glands and without pneumonia, the clinical symptoms being merely high fever and headache (meningeal congestion was very marked in 2 of the 3 cases of which details are given). The organisms isolated post mortem were typical *B. pestis*, very virulent to monkeys, rats, mice, guinea-pigs and rabbits, and have given rise to a general septicaemia, even on subcutaneous inoculation, without formation of buboes. No unusual mortality was observed amongst rats before the recognition of the disease in man, and some infected rats have been since found, but this is hardly sufficient evidence for the suggestion that the epidemic preceded the epizootic.

J. H. S.

FARGIER. *Epidémie de Peste au Cap Saint-Jacques [Cochin China]. (Septembre à Décembre 1911)*.—*Ann. d'Hyg. et Méd. Coloniales*. 1913. Oct.-Nov.-Dec. Vol. 16. No. 4. pp. 931-935.

This epidemic, which began as isolated cases in different parts of the town, localised itself mainly in the old market and its neighbourhood, and enquiry showed that for some time previously dead rats had been found daily in the houses and streets of the market. Only 19 cases

were officially recognised with 17 deaths, most of them showing distinct buboes. A small number were septicaemic in type, and they were all in individuals one or more of whose family had already died of the disease. Energetic compulsory vaccination with Haffkine was carried out with apparently excellent effects.

J. H. S.

ARNOULD. *Epidémie de Peste de Phu-Luu (Province de Bac-Ninh), pendant le 1^{er} Trimestre de 1913.*—*Ann. d'Hyg. et Méd. Coloniales.* 1913. Oct.-Nov.-Dec. Vol. 16. No. 4. pp. 937-945.

A brief notice of an epidemic of about 60 cases, presumably imported from China, with recommendations as to the administrative measures desirable in dealing with the natives of the district.

J. H. S.

DOUCET. *Epidémie de Peste en Nouvelle-Calédonie en 1912.*—*Ann. d'Hyg. et Méd. Coloniales.* 1913. Oct.-Nov.-Dec. Vol. 16. No. 4. pp. 891-901.

LEBOEUF. *Epidémie de Peste en Nouvelle-Calédonie en 1912. Travaux de Laboratoire.*—*Ibid.* pp. 901-910.

COLLIN. *Epidémie de Peste en Nouvelle-Calédonie en 1912. Epidémiologie et Prophylaxie.*—*Ibid.* pp. 910-927.

BÉROS & BOUQUILLON. *Epidémie de Peste de Nérin et de Gondé (Nouvelle-Calédonie, 1912-1913).*—*Ibid.* pp. 927-931.

On the 30th August, 1912, a steamer arrived at Noumea and disembarked passengers and goods at the quay. On the 2nd September 3 rats were found on board dead of plague, and at the beginning of September (Collin says at the end of August) news was received that an unusual mortality had occurred amongst the rats in the north-east of the island, from which quarter the steamer had taken on goods. The ship was disinfected, but 15 days later, on September 17th, the first human case occurred, followed by three more in September, all fatal. No cases occurred from 28th September to 9th October, then a series of fresh attacks began, and the epidemic reached its height in the second week of November to die out by the end of December. In all there were 62 cases, of whom 34 were European with 14 deaths, and 28 natives with 26 deaths, and practically all the early cases were connected in some way with the docks.

At first the disease was very virulent, and buboes only appeared towards the end of an attack, but later crural buboes developed at the beginning of the fever, usually suppurating towards the 7th day. In the later stages of the epidemic serum in large doses proved very useful, but it was ineffective at first. So far as the numbers allow one to form an impression vaccination with Haffkine proved an efficient prophylactic. One case developed numerous cutaneous blebs filled with seropurulent fluid which contained many plague bacilli, a possible source of direct contamination.

There were grounds for stating that the appearance of the disease in the rats of a quarter of the town preceded the development of human cases, if any, by 10-15 days. Owing to the reluctance of the natives,

however, to notify the finding of dead rats and to send in their corpses for examination, it was not possible to follow the progress of the epizootic very satisfactorily.

An account is given by Collin of the general course of the epidemic, the measures adopted to control the outbreak, and the proposals for preventing similar outbreaks in the future, the most important of which is systematic rat-examination and destruction at the beginning of summer, the season of the year when three out of the four recent epidemics of plague in Noumea have started.

At the time when the epidemic at Noumea was dying down, a small outbreak of 11 cases with 9 deaths occurred in the interior of the island, involving the tribes at Nérin and Gondé. The source of this outbreak is obscure as there appeared no likelihood of importation of the disease in these remote villages. Beros and Bocquillon suggest that it was derived from a village 25 kilos. away, where in 1900-1901 plague had been severe, though there is no evidence of the survival of the disease there. As an example of apparently long persistence of plague in a village in one spot, they give the following instance. In 1901 a native contracted plague in a village where an epidemic was in progress, and returning to a house in Pouebo died there. Six years later a native woman developed plague in the same house at Pouebo and was the first case in an epidemic of 38 cases.

J. H. S.

COLLIN (Léon). *Petite Epidémie de Peste en Nouvelle-Calédonie. Considérations étiologiques et diagnostiques.*—*Bull. Soc. Path. Exot.* 1913. Dec. Vol. 6. No. 10. pp. 660-663.

The present outbreak occurred in 1913 in a tribe which had hitherto been free and the source of the infection is obscure. The tribal area lies some 20 kilos. from the villages of Gondé and Nérin, where 11 cases of bubonic plague had occurred in the preceding December, but owing to geographical situation intercommunication is slight and there was no evidence of infection from that source. The cases themselves were curious. Five occurred in August almost simultaneously, with one death, but only one showed a bubo, and the symptoms were those rather of a severe gastro-intestinal intoxication. Four of these were convalescent, when one relapsed after 10 days and died in 30 hours with enormous enlargement of submaxillary and parotid glands. Isolation measures were adopted but 15 days later another case, and a week after that a seventh, occurred, both fatal but only the latter showing a bubo. From the sixth case *B. pestis* was isolated and the writer has no doubt that all were cases of plague. They are remarkable for the absence of buboes without pneumonic involvement in four of the cases and for the exclusively cervical situation of the buboes in the other three, and for the fatal relapse in one case after recovery seemed established.

J. H. S.

GRUBBS (S. B.). *The Plague Outbreak in Porto Rico.*—*Jl. Amer. Med. Assoc.* 1914. Jan. 24. Vol. 62. No. 4. pp. 288-289.

In June 1912 bubonic plague appeared in a district of San Juan,

Porto Rico, and during a sharp outbreak lasting 92 days caused 56 cases with 36 deaths. The infection is believed (though there were other sources possible) to have been imported from Santa Cruz de Teneriffe in the Canary Islands. Sixty-nine cases of plague occurred there in 1906-1907, but the fact was suppressed, and there may have been later cases both in men and rats. The disease occurred in Porto Rico in June, in Havana on July 4th, in New Orleans on July 27th, and in Liverpool on August 1st and 30th, 1912, all these ports being on the route of a line of Spanish steamers which call at Santa Cruz after leaving Spain. Whether the outbreak in Porto Rico was derived from the Canary Islands or not, the concealment of the epidemic in the latter place, which was done deliberately and not from ignorance, is a very regrettable occurrence, complicating gravely and unnecessarily the already sufficiently difficult problems of international sanitation.

J. H. S.

ILVENTO (Arcangelo) & MAZZITELLI (Michele). **Esistenza del Bacillo pestoso nell'Organismo senza Sintomi clinici.** [Existence of *B. pestis* in the Organism without Clinical Symptoms.]—*Riforma Medica*. 1914. Mar. 28. Vol. 30. No. 13. pp. 348-349.

An account of the case of a man who was found to be carrying the *B. pestis* without clinical symptoms. He had been brought under observation as a contact with a case of bubonic plague, and after five days, during which the only suspicious circumstance was a bilateral enlargement of the inguinal and axillary glands to the size of a bean, was sent home again. A week later he came back to hospital with a slight rise of temperature and some malaise following on a debauch, which was enough to account for these symptoms. However, one of the crural glands was punctured and yielded a culture of *B. pestis* (no animal tests). The organism was not found elsewhere, and 15 days later, the general symptoms having returned to normal but the glands remaining enlarged, a second puncture was made with negative result. Observation was continued for a month without any other sign of the infection developing.

J. H. S.

Row (R.). **Curative Value of a "Glycerinated Pest Vaccine" in Plague.**—*Trans. xvii Intern. Congress of Med.* London, 1913. Sect. xxi. Trop. Med. & Hyg. Pt. 2. pp. 49-51.

Vaccine Treatment in Bubonic Plague. [Memoranda.]—*Brit. Med. Jl.* 1913. Oct. 18. p. 1021.

The vaccine in question is derived from young first subcultures or the actual first cultures on agar of the peripheral blood of human cases of septicaemic plague. Such cultures give a uniform emulsion allowing accurate dosage, owing to the fact that the organisms are enclosed, as it were, in a capsule of a "glutinous globulin-like protein" easily soluble in dilute NaCl solution and on that account readily absorbed from the subcutaneous tissues. The bacilli are killed with the help of glycerine without heat or other antiseptic, and are stocked in the strength of 1 agar slope to 1 cc. of 50 per cent. glycerine in normal

saline. For use this emulsion is diluted to the strength of 1 agar slope to 25 cc. of the glycerinated saline, and $\frac{1}{4}$ cc. is injected subcutaneously. This represents about 85-90 million bacilli. This vaccine is claimed to have had a distinctly curative action in cases of plague not actually septicaemic. At the time of injection an agar-culture is made from the patient's finger, and the writer has never seen a case of plague recover in which the bacillus was isolated in this way. In 89 consecutive cases treated with the vaccine 47 gave such positive cultures, i.e. were septicaemic, and all died, while of 42 apparently not septicaemic only 7 died, the others (83·6 per cent.) recovering. During the first 6-12 hours after the injection there was a distinct increase of temperature and exaggeration of symptoms, i.e., a definite reaction in all cases which resulted favourably, the others showing no reaction, and 12-24 hours after injection, especially if given in the first three days of the disease, a general amelioration sets in, the buboes usually subside, and there is a rapid recovery.

J. H. S.

STEVENSON (W. D. H.). **The Absence of a "Negative Phase" after Inoculation with Plague Prophylactic.**—*Proc. Second All-India Sanitary Conference, 1912.* Vol. 3. pp. 94-99. (1913. Simla: Govt. Central Branch Press.)

280 rats (*M. rattus*) in 8 groups of 35 each were inoculated with a standard dose of vaccine at varying intervals before they received a standard dose of spleen emulsion containing ·0019 mgm. of spleen from a rat dead of plague. One group received no vaccine and served as control. Of this control 88 per cent. died of plague.

Of those vaccinated 1 day previously 62·8 per cent. died of plague.

"	3 days	"	39·7	"	"
"	5	"	54·5	"	"
"	7	"	62	"	"
"	9	"	64·7	"	"
"	10	"	63·6	"	"
"	14	"	56·2	"	"

In a second experiment 7 groups of rats, each group containing 40 rats, were inoculated with a similar emulsion containing ·0009 mgm. of spleen-tissue, with the following result:—

Of the controls with no previous vaccination 85 per cent. died.

Of those vaccinated $1\frac{1}{2}$ hours previously 82·5 per cent. died of plague.

"	5	"	77·5	"	"
"	$8\frac{1}{2}$	"	65	"	"
"	22	"	64·1	"	"
"	46	"	50	"	"
"	3 days	"	71·7	"	"

There is therefore no appearance of a negative phase in rats, the protection developing in a few hours, rising till the second or third day, and after a slight decline remaining more or less steady up to the 10th to 14th day. The rats used were susceptible Madras rats.

J. H. S.

SCHÖBL (Otto). **Bacteriological Observations made during the Outbreak of Plague in Manila in 1912.**—*Philippine Jl. of Science*. Sect. B. Trop. Med. 1913. Dec. Vol. 8. No. 6. pp. 409-426. With 1 plate.

Schöbl looks on blood culture as a very valuable diagnostic method in the febrile stage of the disease, and succeeded in isolating the *B. pestis* by this means in 14 out of 15 cases tried, even in the absence of a bubo and before signs of pulmonary involvement. Puncture of the bubo frequently failed to show the organism. In the early stages repeated puncture usually gave it, but later on, especially in cases which recover, it disappears from the gland, apparently taken up by phagocytes. The bacillus was also found in large numbers in skin lesions, and a case occurred in which the patient was discharging large numbers of bacilli in his sputum while still able for work.

An account is given of an epidemic in laboratory animals which was spread by fleas, and a case is recorded of a natural infection in a cat, where the bacillus was clearly identified by culture and animal experiments. *B. pestis* was not found in bed-bugs from the beds of infected patients, nor in dog fleas in infected houses. A brief notice is given of the findings in the many thousand rats examined for plague.

J. H. S.

KATO (S.). **An Investigation on the Transmission of Plague by Fleas.** [In Japanese.]—[*Jl. of Bacteriology*. Japan. 1913. Dec. No. 218.]

The author made several investigations in order to ascertain whether fleas transmit the germ of plague by means of the faeces or by bite, and whether transmission is biological or mechanical. He injected the plague bacilli into experimental animals repeatedly, strengthening the virulence, and then injected them into mice, rats and guinea-pigs and fed fleas upon these (fixing the fleas with a silver wire). In one third of the fleas the germs were found in the stomachs (most of them on the third day), and were recognised there for nine days after they sucked the blood. The germs remained in the faeces of the fleas without losing virulence. The author rubbed the germ-containing faeces over the shaved skin of the abdominal walls of the experimental animals. Five of 26 guinea-pigs thus treated died after seven days, with gangrenous ulceration of the rubbed part of the belly and severe inflammation of the inguinal glands of the same side, but the rats and mice which were treated by the same method had no symptoms. The author fed also infected fleas upon healthy animals. One mouse out of ten and three guinea-pigs out of 26 died, but no local change could be recognised. He rubbed, next, ground fleas (infected) over the shaved skin of the abdominal walls of the guinea-pigs; twelve out of 42 were infected. On the other hand, he fed uninfected fleas upon the shaved abdominal walls of the guinea-pigs and rubbed the faeces of the plague infected fleas as well as the cultivated plague bacillus over the bitten wounds, with negative results in all 20 experiments. He placed an infected guinea-pig and a healthy one in a box, separated by a septum so as they could not communicate with each other, and put many fleas into the box. In this experiment he found that the healthy animals were infected every time.

From the above experiments the author concludes that bubonic plague is caused by means of the bite of the flea and it is very probable that the disease is transmitted by the flea not only mechanically but that also the ingested germs come to the biting apparatus from the stomach of the flea. [See on this subject BACOT and MARTIN, this *Bulletin*, Vol. 3, p. 201].

M. Kumagawa.

LISTON (W. Glen). **Plague Preventive Measures.**—*Proc. Second All-India Sanitary Conference, 1912.* Vol. 3. pp. 100-105. (1913. Simla : Govt. Central Branch Press.)

Measures for the prevention of plague in man must be designed to prevent the spread of the disease in rats. But whereas in the similar cases of glanders, hydrophobia or anthrax authorities can enforce the destruction of valuable animals, they have no powers to enforce the destruction or exclusion of rats, even in the case of premises where they are known to swarm and are a serious menace to public health. The conditions which encourage rats are chiefly an ample food supply, shelter for breeding and the absence of enemies, and it is in modification of these conditions that a permanent plague policy must find its basis. In the ordinary house, and even in places where much has been done to provide an efficient sanitary and drainage system, there is usually plenty of food for rats, and this is largely due to inefficient scavenging. A good system of removing waste would reduce very materially the opportunities offered to the rat, but it is rare to find scavenging adequately and systematically carried out. Of course there will long remain the harbourage afforded by grain-stores, but in Bombay the storing of grain in larger quantities than is necessary for retail sale is already prohibited in shops which form part of inhabited dwellings, and it might easily be made compulsory to store the grain in rat-proof receptacles when the shop is closed and not in the open basket which is so common. Rat-proof market-places are not impossible, and it is hoped to make trial of one at Belgaum shortly. The rat is nocturnal in habit and prefers dark places. Well-lit and well ventilated rooms they dislike, and attention to the construction of dwelling houses is therefore of the greatest importance. Yet little is done in this direction. It should be possible to insist on the 63½° standard of lighting and ventilation, allowing a period of years within which the necessary alterations must be made, but closing definitely and at once all the very bad quarters which are really unfit for habitation. If the people could be educated to appreciate that the rat is an enemy, they would cooperate in this, and a systematised organisation of instruction would repay the cost. With even only a small outlay much might be done at present by utilising existing organisations, and teaching by lecture and demonstration could be arranged in many places where little or nothing of the kind is being done.

J. H. S.

ROSS (W. C.). **The Prevention of Plague.**—*Proc. Second All-India Sanitary Conference, 1912.* Vol. 3. pp. 90-92. (1913. Simla : Govt. Central Branch Press.)

Ross points out that the use of pulicidal or combined disinfectants

in infected houses has only a temporary and possibly misleading protective effect. Rat-destruction also can only be a temporary measure in practice, and the use of vaccines, while they might be made much more efficient by graduated and repeated dosage, confers only an individual immunity without reducing the sources of infection. The proper method in India, he says, of breaking the chain between the rat and man is to alter the relation in which the rat lives with regard to man.

J. H. S.

DE RAADT (O. L. E.). **Pestbestrijding te Shanghai en Pestbestrijding op Java.** [Plague Measures in Shanghai and Java.]—*Geneeskund. Tijdschr. v. Nederl.-Indië*. 1914. Vol. 54. No. 1. pp. 66-72.

De Raadt defends the plague measures adopted in Java from the criticisms made by van DRIEL (this *Bulletin*, Vol. 3, p. 207) that they lost in practical efficiency by their attention to so-called academic and theoretic questions. He points out that it is only on the basis of epidemiological and biological studies of the disease in rats and fleas as well as man that preventive measures can be properly directed, and that such academic study may be of direct financial importance, e.g., it is useless to pay for the corpses of field-rats if they do not carry plague. He maintains that the efficiency of the plague measures taken in Java, based like the Shanghai measures on the maxim that a rat-free house is a plague-free house, proved to be no less great than the elaborate procedure at Shanghai adopted by van DRIEL, which de Raadt criticises in his turn.

J. H. S.

BROWNING-Smith (S.). **A Simple Method of Rat Destruction.**—*Proc. Second All-India Sanitary Conference, 1912*. Vol. 3. pp. 70-71. (1913. Simla: Govt. Central Branch Press.)

A cheap and simple method of driving the fumes of burning sulphur into rat-holes, which has given excellent results in the limited experience as yet obtained.

J. H. S.

SWELLENGREBEL (N. H.). **Een Tweede Geval van Ratpest op een Schip in de Haven van Amsterdam.** [A Second Case of Rat Plague on a Ship in Amsterdam Harbour.]—*Nederl. Tijdschr. v. Geneeskunde*. 1914. Feb. 7. I. Helft. No. 6. pp. 393-396.

The writer received from a steamship from Montevideo the corpse of a rat which had been taken alive and killed on board. On examination the glands were a little swollen and haemorrhagic, the spleen was enlarged, but there was no subcutaneous haemorrhages nor pleural exudate. From his experience in Java he suspected that this rat might be suffering from subacute plague. Inoculation of material from the glands and spleen subcutaneously into a guinea-pig killed it in two days with greatly enlarged glands and subcutaneous haemorrhagic oedema but no enlargement of spleen, and plague bacilli could not be seen in glands or spleen. Another pig inoculated from the glands of the first died with typical signs of plague, the bacilli were present in large numbers in all organs, and typical cultures were obtained from the spleen, virulent for rats and guinea-pigs.

No dead rats were found on the ship and no other infected rat was met with. The writer believes that this animal was infected when it came on board but owing to the scarcity of bacilli in its peripheral blood had caused no infection in other rats. Plague of this type can run a course of $1\frac{1}{2}$ months in one animal, according to the writer, and the voyage lasted only 29 days. Such animals may be a source of danger, for the disease may pass into the acute type or the animal may be eaten by other rats and infect them by way of the intestinal tract. (In a note it is added that two cases of plague in *M. decumanus* have recently been met with in Amsterdam.)

J. H. S.

SWELLENGREBEL (N. H.) & OTTEN (L.). Ueber "mitigierte" Pestinfektion bei Ratten und Meerschweinchen. ["Subacute" Plague in Rats and Guinea-pigs.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. March. Vol. 18. No. 5. pp. 149-159.

This is characterised by the protracted course, a month or more, of the disease before death occurs, and by the pathological picture. There is no enlargement of the spleen, scarcely any subcutaneous oedema, no evidence of encapsulated areas, adhesions or resolution, but multiple small axillary or inguinal buboes, perhaps exudate in the serous cavities, and notably haemorrhages in all organs. Plague bacilli cannot be seen in glands, spleen, lungs or exudate, and inoculation into a second animal may produce only a similarly chronic disease. The condition is shown to be pest, since inoculation from the second into a third animal usually produces acute typical plague. This may occur with the first transference, or may be delayed until a fourth passage, but eventually one or other passage produces the acute disease.

The writers, who believe this condition to be different from chronic or resolving plague and one not previously described, met with it in a plague rat, and in guinea-pigs inoculated with the rectal contents of infected fleas (*X. cheopis*), and produced it in other conditions where the inoculated material was supposed to be of low virulence. They were able to produce it also by cutaneous, though not by subcutaneous, inoculation of very small doses of fully virulent bacilli. They consider that it may be of importance in spreading the disease from one place to another, since the infected animal remains well for weeks, and, although the number of organisms is too small to infect fleas so long as the disease remains subacute, there is a possibility of its passing over into the acute form. The possible failure of inoculation from a suspected animal to produce acute plague, and the fact that an apparently healthy rat may really be infected make still more difficult the diagnosis, e.g. in the case of ship-rats.

J. H. S.

MARKL. Kasuistischer Beitrag zur Rattenpest.—*Centralbl. f. Bakt.* I. Abt., Orig. 1914. Feb. 25. Vol. 73. No. 2. pp. 135-136.

Markl notes that while it is usual, owing to the overgrowth by other organisms, to experience difficulty in isolating *B. pestis* in direct culture from rats found dead, this may sometimes be achieved from the heart contents, and gives details of a case in which this was successful when animal inoculation, other than by rubbing into the skin, failed.

J. H. S.

DE BEAUFORT (L. F.). Bericht über eine Untersuchung einiger in 1911 von Dr. J. J. Van Loghem auf Java gesammelten Ratten. [Report on an Examination of some Rats collected in 1911 in Java by Dr. Van Loghem.]—*Mededeelingen v. d. Burgerlijken Geneeskund. Dienst in Nederl-Indië*. 1913. Vol. 2. No. 2. pp. 5-14.

A systematic description of the rats in question, which included the following groups: *Chiropodomys gliroides*, Blyth (tree-rat); *Nesokia setifera* (Horsf.); *M. rattus*, L., in two varieties, of which the one has a grey abdomen and the tail longer than the body plus head, the female having 5 pairs of mammae, and the other has a white abdomen, a tail not longer than body plus head and 6 pairs of mammae; *M. decumanus*, L., with also a melanistic variety of colouring; and *M. concolor* Blyth, a smaller variety of *M. rattus*. The second variety of *M. rattus* is a field rat, corresponding to *M. diardii* of Jentink; the first is chiefly a house-rat but apparently invades the fields at certain seasons of the year, viz. July to October, and it corresponds to the *M. rattus griseiventer*, Bonhote, found in Malaya. A short description is also given of other rats hitherto recorded as occurring in Java, viz. *Pitechir melanurus*, Cuvier (tree-rat), *M. bartelsii*, Jentink (hill-rat), *M. lepturus*, Jentink, *M. jerdoni*, Blyth (hill-rat), as well as *M. musculus*. The author states that while the long-tailed *M. rattus* is the common house-rat in Java, in the Papuan houses in New Guinea he found a quite different rat, viz. *M. browni*.

J. H. S.

DE RAADT (O. L. E.). Beitrag zur Kenntniss der Unterschiedsmerkmale zwischen javanischen Haus- und Feidratten in Beziehung zu der Epidemiologie der Pest auf Java. [On the Differentiation of Field and House Rats with reference to Plague in Java.]—*Mededeelingen van d. Burgelijken Geneeskund. Dienst in Nederl-Indië*. 1913. Vol. 2. No. 2. pp. 32-37. With 1 plate.

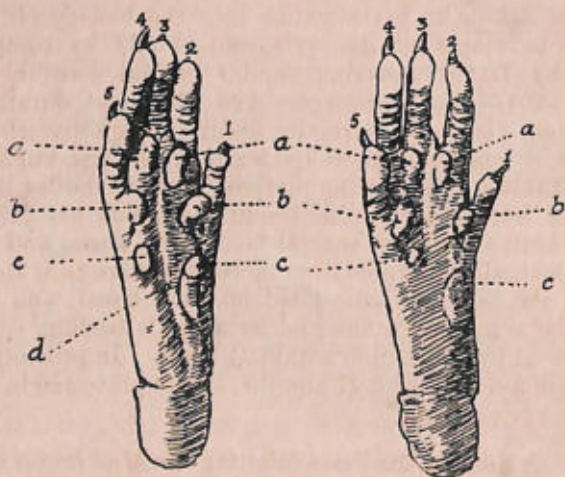
Bijdrage tot de Kennis der Onnderscheidskenmerken tusschen Javaansche Huis- en Veldratten met Betrekking tot de Epidemiologie der Pest op Java.—*Geneeskund. Tijdschr. v. Nederl-Indië*. 1914. Vol. 54. No. 1. pp. 31-37. With 3 plates.

Of the three varieties of *M. rattus* found in Java, *M. rattus griseiventer*, Bonhote is a house-rat considerably infested with fleas, *M. concolor*, Blyth is also a house-rat, while *M. rattus diardii*, Jentink, is a field-rat with a relatively small number of fleas. The two former are therefore of much the greatest importance in connection with plague. The females are readily distinguished by the number of mammae, but it is not always possible to distinguish the male field-rat from the male house-rat by the usual criteria of colour and length of tail. This can be done, however, by the pads on the hindfeet. This criterion was used by HOSSACK to distinguish *M. decumanus*, *M. rattus* and *Nesokia bengalensis*, but can equally be used to distinguish the house from the field varieties of *M. rattus*, at least in Java. The plantar surface of the foot shows three rows of pads arranged in pairs. The most distal pair are situated one at the base of the second toe, the other at the bases of the third and fourth toes, and the middle pair lies at the bases of the first and fifth toes. Of the proximal pair one has its long axis corresponding with the long axis of the foot, and the other,



1.

2.



1.

2.

1. *M. rattus griseiventer* Bonhote (house rat).

2. *M. rattus diardii* Jentink (field rat).

a.a. distal pads. *b.b.* middle pads. *c.c.* proximal pads. *d.* depression or furrow between proximal pads, and extending along sole of *M. rattus griseiventer*. [To illustrate de RAADT'S paper.]

smaller, lies about midway between the heel and the longest toe. It is this proximal pair which affords a means of distinguishing between the house and field varieties of *M. rattus*. In the house-rat both pads are raised definitely above the general level of the sole of the foot, producing between them a distinct depression or furrow. In the field-rat the last described pad is usually rudimentary and rises, if at all, very slightly above the general level and the other pad is also much less developed than the prominent wart-like pad of the house-rat. There is thus no furrow and the sole is almost flat in front of the heel. Transitions occur but, using this criterion alone, the writer in 1,000 house-rats found only 4 per cent. of doubtful cases and in 1,131 field-rats again only 4 per cent. of doubtful cases. The difference is said to be easily learned and to be more reliable than shades of colour. Generally speaking the development of the pads corresponds with the habits of the animal in respect to climbing; the greater the tendency of a rat to climb, the more prominent being the development of the pads. A series of photographs is given to illustrate the development in different kinds of rat.

J. H. S.

STRICKLAND (C.). *The Biology of Ceratophyllus fasciatus Bosc., the Common Rat-Flea of Great Britain.*—*Forty-Second Ann. Report of the Local Govt. Board 1912-1913. Supplement containing Report of Medical Officer for 1912-1913. Appendix B. No. 5. pp. 401-412. 1914. London: Printed under the Authority of H.M. Stationery Office. [Cd. 7181.]*

This paper details an investigation into the biology of *C. fasciatus* in the various stages of its cycle, and should be compared with the paper by BACOT covering similar ground (see this *Bulletin*, Vol. 3. p. 204). Both observers find that the duration of the various stages is very variable under apparently similar conditions, and is most influenced by temperature and humidity. The presence of rubbish or sheltering material protects the flea in all stages to a marked extent even from conditions which are fairly severe. The imago feeds readily on several facultative hosts, and Strickland states that man appears to be even more attractive to it than the rat. But it will not copulate unless fed on rat's blood, and even after starvation for some weeks followed by a single feeding, copulation is always followed by oviposition within 24 hours. In protecting rubbish the imago will live unfed for 17 months, and unprotected in favourable conditions for one month.

J. H. S.

ROSS (H.). *A Note on the Fleas infesting the Mus Rattus in Naini Tal and Mussoorie.*—*Proc. Second All-India Sanitary Conference, 1912. Vol. 3. pp. 88-89. (1913. Simla: Govt. Central Branch Press.)*

A record of the flea counts obtained during the months May to October [1912 (?)], based on the examination of from 120 to 300 rats per month, and showing the relative proportions of *X. cheopis* and *C. fasciatus* during this period. An increase in the counts occurred in the rainy seasons, August to early October, reaching the figure of 4.5 per rat in September, and falling off again quickly at the end of October. *X. cheopis* was always present in the greater numbers, but whereas the proportions in May to June were as 1.4 to 1, in August it was 12 to 1, and in September and October as 7.4 and 6.6 to 1.

J. H. S.

TROPICAL SKIN DISEASES.

CHALMERS (Albert J.) & O'FARRELL (W. R.). **The Trichonocardiasis.**
—*Ann. Trop. Med. & Parasit.* 1913. Dec. 30. Vol. 7. No. 4.
pp. 525-540. With 2 plates.

Trichonocardiasis is a name applied to a parasitic disease affecting the shafts of the hair. The parasite does not penetrate into the hair follicle. CASTELLANI named the disease Trichomycosis axillaris and subdivided it into three varieties, flava, rubra and nigra, but as the affection also occurs on the hairs of the pubes, in some cases without any axillary infection, the authors believe that the name Trichonocardiasis is better. The three varieties of the condition have been found in the Anglo-Egyptian Sudan and Chalmers observed a condition resembling Trichonocardiasis flava in Europeans on the Gold Coast in 1898. All three may be found on the same person. The parasite which causes them has been named by CASTELLANI *Nocardia tenuis* and in some instances it is associated with micrococci, e.g. *Micrococcus nigrescens* (Castellani, 1911) and *M. castellanii*, Chalmers and O'Farrell, 1913. A description of the causal parasite and these cocci is given.

The disease apparently spreads from man to man and the incubation period is from two weeks upwards. The infection causes no general symptoms and is only discovered by accident. The health of the hair is not affected. The infection does not appear to be in any way associated with excessive sweating.

It appears to have a marked tendency to remain in the region or regions which it first infected and does not tend to spread over the body. For treatment a lotion of one drachm of formalin to one ounce of water applied twice daily to the affected hairs with a two per cent. sulphur ointment at nights is recommended by CASTELLANI. A coloured plate and a plate of microphotographs show the appearance of the affected hairs and the characteristics of the fungus in cultures and microscopically.

G. C. Low.

CHALMERS (Albert J.) & STIRLING (A. D.). **Epidemic Trichonocardiasis.**—*Ann. Trop. Med. & Parasit.* 1913. Dec. 30. Vol. 7. No. 4. pp. 541-544. With 2 figs.

An account of an epidemic of Trichonocardiasis rubra. A private in the Welsh Regiment stationed in Khartoum applied for medical treatment on account of irritation of the skin in both axillae. The occurrence of the case led to a systematic examination of the regiment when no fewer than 42 other cases were discovered. An investigation made as to the possible source of infection threw suspicion upon the washermen of the regiment. CASTELLANI's formalin lotion and two per cent. sulphur ointment were applied, the results being excellent, but the treatment required time, cure not being effected under three to four weeks. If the cases did not improve under the above treatment, an application of tincture of iodine effected a cure in three to four days. Tincture of iodine alone was not specially efficacious. In the authors' opinion the best remedy was a formalin sulphur application for two days, followed by tincture of iodine.

G. C. L.

JOHNS (Foster M.). **The Occurrence of the Trichonocardias in New Orleans.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914, May. Vol. 1. No. 11. pp. 782-786. With 1 plate.

The author refers to CHALMERS and O'FARRELL's article on Trichonocardias in the *Annals of Tropical Medicine and Parasitology* [see above.] He records the case of a medical student in Tulane University who suffered from the red and yellow variety, the fungus attacking the hairs of his axillae. The causative fungus of the disease, *Nocardia tenuis* [not *Mocardia tennis* nor *Mocordia tennis* as used throughout the paper] was found. Some cultural experiments were conducted with the parasite and the author points out in his conclusions that, as the disease exists in New Orleans as well as in other parts of the world, it is probable that it has a world-wide distribution in tropical and subtropical countries.

G. C. L.

PRIESTLEY (Henry). *Microsporon scorteum* (n. sp.) from a Case of Ringworm in Man.—*Ann. Trop. Med. & Parasit.* 1914. April. 21. Vol. 8. No. 1. pp. 113-117. With 1 plate.

The author states that skin diseases due to parasitic fungi are not of very frequent occurrence amongst the population of Queensland. He therefore believes it of interest to record a case from the lesions of which a fungus new to science has been isolated. The patient was about fifteen years of age and showed two circular inflamed areas of about 30 mm. in diameter on the skin of the outer side of the calf. The edges were well defined and inflammatory changes were only noticed in the peripheral parts, which were slightly raised. There was no scaliness, nor did the hair seem to be affected. There was slight itchiness in the affected areas but beyond that there were no subjective symptoms. The lesions cleared up of themselves in about four weeks, the only treatment being scrubbing with soap and water. Microscopic examination of hairs from the lesions showed them to contain only a very few spores and little mycelium.

The most striking feature in the development of the parasite was the early appearance of great numbers of multiseptate spores; though a few were unicellular, the majority had from three to six divisions and varied in length from 35 to 60 μ with a width of 11 to 4 μ . In most of the cultures lateral conidia were scanty, and chlamydospores were infrequent and not sharply defined within the mycelial threads except in some old cultures.

The systematic position of the fungus, according to the author, is difficult to decide as it presents characters belonging to the trichophytons and also to the microsporons. The great abundance of the multiseptate spores, the pectinate bodies and the formation "en raquette" of certain mycelial elements would place it amongst the microsporons, while on the other hand the presence of spirals and nodular bodies together with the absence of spines on the multiseptate spores would place it amongst the trichophytons. The author finally decides that the parasite belongs to the quick growing microsporons of animal origin, but he has been unable to trace the source of infection. Attempts to infect guinea-pigs were unsuccessful. In some ways the microsporon resembles *M. fulvum* as described by URIBURU (1909)

but as spirals have not been described for that parasite and fine mycelial outgrowths are absent in the Australian one, the author comes to the conclusion that the latter is a new species. On account of the resemblance of the cultures to chamois leather he proposes the name *Microsporon scorteum* for it.

G. C. L.

JOYEUX (Charles). *Contribution à l'Etude des Teignes Africaines. Trichophyton Soudanense.*—*Arch. de Parasit.* 1914. Mar. Vol. 16. No. 3. pp. 449-460. With 6 text figs., and 1 plate.

In a preliminary note (*Compt. Rend. Soc. Bis.*, 1912. Vol. 73, p. 15) the author recently described a new species of *Trichophyton* met with in Upper Guinea. He now gives a more complete description of the parasite, adding some other remarks on the tinea of that country. As in Europe, such diseases are best seen in children, the affections tending to disappear as adult age is reached. The new *Trichophyton*, cultivated in a similar manner to others in a collection of the hospital of St. Louis by Dr. SABOURAUD, offers sufficient differences for it to be considered a new species. It differs from the other *Trichophytons* of the *endothrix* group—*crateriforme*, *acuminatum* and *violaceum*—by its form and colour; it shows neither the fissured appearance of *T. effractum*, nor the umbilicated aspect of *T. umbilicatum*, nor the crateriform appearance of *T. regulare*. It seems therefore, to the author, legitimate to make it a new species.

The characteristics of the new fungus on different culture media are described. Inoculations have always proved negative, guinea-pigs and rats having been experimented with.

The name "Soudanense" has been given on account of the geographical area in which the cases were found.

G. C. L.

MONTGOMERY (Douglass) & CULVER (George D.). *Eczema marginatum of the Toes.*—*Jl. Amer. Med. Assoc* 1914. Apr. 4. Vol 62. No. 14. pp. 1076-1078.

SABOURAUD has demonstrated, the author points out, that a number of cases that used to be regarded as eczema of the toes are really dermatitis caused by the same fungus that produces eczema marginatum (Dhobi's Itch) of the crutch. SABOURAUD has named the fungus *Epidermophyton inguinale*, this resembling, but not being identical with the ordinary ringworm fungus. The parasite lives on the skin and does not attack the hair. It gives rise to its most characteristic lesions on the inner side of the thighs of the male, against which the scrotum rests. The disease may also occur in the axilla and in women under the breasts, while as now stated the toes may also be affected. When found in the latter situation it gives rise to a disease resembling intertrigo or eczema. The authors describe a case in which the toes of the right foot were attacked. The infection was very persistent but eventually active treatment—chrysarobin ointment chiefly—killed the fungus out and cured the disease. For such cases SABOURAUD employs a one or two per cent. chrysarobin ointment, WHITFIELD a ten per cent., while in the case above mentioned a five per cent. strength was used.

G. C. L.

CULPEPPER (W. L.). A Case of Dhobie Itch (*Tinea Cruris*) with Notes on the Thermal Deathpoint, Gross and Microscopical Drawings of the Causal Fungus (*Epidermophyton Rubrum*).—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914. Feb. Vol. 1. No. 8. pp. 584-587. With 1 text fig. & 1 plate.

A water bath in which experiments on the thermal death point of the fungus were made is first described in detail; it was determined to be 80° C. for ten minutes. A table gives the results of the experiments. Numerous attempts to infect guinea-pigs, rabbits and white mice were made, but all proved unsuccessful. The author however succeeded with himself by scarifying a place with a scalpel and rubbing the fungus on it.

In eight days a small lesion resembling that of ringworm was noticeable. Ten days later the lesion was about the same size but was longer, of an irregular abrupt form, angry red colour and somewhat elevated round the edges. Scales from this were inoculated on Sabouraud's medium and in eight days a growth appeared round one of these. Smears made from the growth on the skin also showed the fungus. Twenty-one days from the date of inoculation 80 per cent. carbolic acid was applied to the spot, with the result that all symptoms disappeared leaving a small white scar behind.

G. C. L.

CASTELLANI (Aldo). *Tinea Imbricata* (Tokelau).—*Brit. Jl. of Dermatology*. 1913. Dec. Vol. 25. pp. 377-400. With 25 figs.

The author defines the term "*Tinea imbricata*" as a tropical dermatomycosis, or more correctly a group of dermatomycoses, due to fungi of the genus *Endodermophyton*. Clinically the disease is characterised by the presence of extensive, flaky, scaly patches, the scales being large, tissue-paper-like, firmly adherent by their bases and arranged in concentric rings or parallel lines. The name *Tinea imbricata* was given to the disease by MANSON, who studied the condition in China from 1879 to 1882.

The author, using special technique, has succeeded in growing the fungus causing the disease and has shown that if this is inoculated into human beings the typical disease is reproduced. Three species of *Endodermophyton* are described as being found in man: *E. concentricum*, *E. indicum*, these causing *Tinea imbricata*, and *E. castellanii* causing *Tinea intersecta*. The characteristic growths of these different fungi are given in detail in the paper. [Those interested should consult the original.]

The disease has an apparently different clinical picture from any other type of body ringworm; inflammatory signs are totally absent. As regards prognosis the disease has no tendency to spontaneous cure and the treatment is difficult; the general health is not much affected but in hot weather itching is very troublesome. In chronic cases anaemia, general weakness and emaciation have been noted.

The author has tried many different treatments. Chrysarobin ointment (five to ten per cent.) in repeated applications often induces rapid improvement in cases which are not of long standing. The eruption however comes back again very shortly and during the application of the drug the patient must be watched carefully and

the urine regularly tested. Resorcin dissolved in compound tincture of benzoin (60 to 120 gr. of resorcin to 1 oz. of the tincture of benzoin) is now used as a routine treatment for the disease in the Colombo hospital. This is freely applied once or twice daily to the affected regions. In cases where the whole body is affected, half the body is painted one day and the other half the next and so on alternately. The treatment must be continued for several weeks and during that time the patient may be given several hot baths and scrubbed well over with sand soap. Strong liniment of iodine has also been used. If seen early, while in isolated patches, it is easy to cure, but when advanced it is extremely difficult.

The paper is well illustrated, a coloured plate and many very excellent photographs, both of the cultures of the fungus and the skin lesions, being incorporated in the text.

G. C. L.

VASCONCELLOS (Figueiredo). **Contributions à l'Etude des Dermatomycozes du Brésil.** i. *Trichophyton griseum* n. sp.—*Mem. do Inst. Oswaldo Cruz.* 1914. Vol. 6. No. 1. pp. 11-17. With 2 plates.

The ringworm, of which the author describes the parasite, was first observed by Paulo PARREIRAS HORTA who isolated the fungus producing it. The patient presented a lesion, roughly 4 cm. by 3, over the radial border of the flexor aspect of the left forearm, just above the wrist. The lesion had a somewhat oval form and presented an elevated surface resembling in some ways the plaques of lichen planus. At the edges of the lesion, which was a yellow grey colour, were some intact vesicles and some scales which were formed by the ruptures of other vesicles. When these were treated by liquor potassae small spores and filaments became evident. Sown on Sabouraud's maltose gelatin a pure culture of the fungus was obtained. A detailed account of its different appearances on various culture media is given and from these the author concludes that the trichophyton is a new one though related to the *Trichophyton gypseum* group of SABOURAUD. At first white, the growth later becomes grey, and therefore the name *Trichophyton griseum* is proposed for it.

Multiseptate filaments which originate from the mycelial extremities are very abundant and conidia are also numerous, but the author has not detected spiral forms which are present in certain of the trichophytons of this group.

Photographs showing the lesions on the arm and the appearances of the culture are given, the latter also being depicted on a coloured plate.

G. C. L.

PINOY (E.). **Un Traitement des Mycétomes.**—*Bull. Soc. Path. Exot.* 1913. Dec. Vol. 6. No. 10. pp. 710-711.

Iodide of potassium, which produces such good results in the treatment of actinomycosis and sporotrichosis, appears to produce little effect on mycetoma, though the parasite of this disease resembles that of actinomycosis. Recently NICOLLE and MISK are said to have obtained cures by the employment of iodide of potassium internally with local applications of iodine and iodide, the one in a case of mycetoma due to *Madurella tozeuri*, the other in a case due to *Madurella*

mycetomi. The author regrets that these observations have not been published. He believes however that if one can favourably combat the local oedema which accompanies mycetoma the action of the iodide will be more favourable. His treatment consists of submitting the patient to a diet free of chlorides and making, at the level of the oedematous lesions, deep openings by means of the thermocautery. Iodide of potassium is then given in doses of four to six grammes per day. If the patient complains of the absence of salt in the diet, this can be supplied to the food by means of iodide, provided that one does not pass the amount of two or three gm. for a litre of bouillon or a pound of meat.

G. C. L.

BRAULT (J.). *Note à propos de l'Enanthiothamnose*.—*Bull. Soc. Path. Exot.* 1914. Feb. Vol. 7. No. 2. pp. 90-91.

In the month of January 1911 the author observed three projecting tumours, in an Arab, in the region of the umbilicus. These in their general configuration reminded him of *Molluscum contagiosum*. Cultivations however showed that a fungus was present in a state of purity, this being identical with that found by the author in numerous cases of what he has termed pseudo-molluscum. The histopathology and experimental work on cultivation is not entered into in this note. The fungus has been classified by PINOY, to whom the author sent cultures and sections showing the parasite *in situ* in tissues. He calls attention to the fact that BRUMPT in his *Précis de Parasitologie* has given the wrong measurements for the septate filaments.

G. C. L.

HORNSEY (John F.). *Dermatitis Venenata due to Rungus*. [Memoranda.]—*Brit. Med. Jl.* 1914. Apr. 4. pp. 759-760.

A form of dermatitis is described due to contact with any part of a tree called by the natives of British North Borneo *rungus* or *ringus*. The tree is found especially in the district of Maruda Bay. Within 24 hours of handling the tree the skin becomes affected with a most intolerable itching; this is soon followed by the appearance of a rash consisting of clusters of raised red papules, which are noticed first on those portions of the body which have actually come into contact with the plant, and later over the rest of the body. With the rash the temperature is raised and there is a general sensation of malaise. Within 48 hours the papules become vesicles, or even large bullae, filled with a clear serous fluid. These, after becoming confluent, burst and yellow crusts are formed. In severe cases the bullae become infected with ordinary cocci and, as a result, foul ulcers are seen, covering in many instances a large part of the body.

If left untreated, the disease generally runs a course of five to seven days in mild cases; healing takes place naturally with very little permanent disfiguration unless the patient has scratched the lesions. When pus-forming organisms secondarily attack the lesions permanent scars may be left. The author has seen pneumonia occurring as a sequel, especially in cases where the mouth and nostrils were affected. Coolies cutting wood and jungle often get infected from handling these trees. The leaves resemble those of the *jaborandi*.

G. C. L.

CHAZARAIN-WETZEL. **Un Cas d'Eczéma de la Laque.**—*Bull. Soc. Méd.-Chirurg. de l'Indochine.* 1914. Apr. Vol. 5. No. 4. pp. 126-128.

A militiaman, whilst searching for wood in a forest, found himself in the vicinity of a lacquer tree which the Annamites call "Cây-Son." He did not brush against it nor touch it. After his return a general inflammation and oedema appeared on his face. On the following morning he was taken into hospital. The oedema was then very pronounced, while the lips and eye-lids were also swollen, the latter so much that he could not open his eyes. There was no fever. The following day a vesicular eruption appeared on the nose and ears. The treatment adopted was a saline purgative with inunctions of boracic vaseline and an ointment of oxide of zinc. On the third day the oedema had diminished, on the fourth the eruption was much less intense, whilst on the sixth day it had completely disappeared except on the ears. On the tenth day the cure was complete.

Cases of this affection are relatively frequent in Indo-China, especially amongst the natives, who affirm that it is not necessary to touch the tree with the skin, walking in the undergrowth in the vicinity being sufficient. In the Province of Bac-Kan a notion is prevalent that the odour of the tree is sufficient to give one eczema. The author asks "Is it not possible that the plant *Rhus vernicifera* throws out a volatile toxic acid during the summer months?" The incubation of the malady would seem to be 24-36 hours.

DEGORCE, who joined in the discussion, recorded the case of an Annamite child twelve years of age who exhibited an erythematous vesicular eruption on all the uncovered parts of the body—face, neck, hands, wrists, feet and lower parts of the legs. This child stated that before the eruption appeared he had approached lacquer trees during his work, but had not touched them. The eruption was cured quickly by applications of oxide of zinc.

MATHIS stated that the plant which had given rise to these lesions was probably, according to the information furnished by CREVOST (Director of the Tonkin Museum), a species of *Rhus semialata* (Murr), in Annamese *cay-muoi*. The species cultivated for the liquid lacquer is *Rhus succedanea* (Linnaeus), in Annamese *Cây son*. In Tonkin no other species of trees from which lacquer is obtained is known, for example such trees as are found in Southern Indo-China, *Melanorrhœa usitata* (Wall) and *M. laccifera* (Pierre). As for *Rhus vernicifera* (De Candolle), that is a species found in Japan which has not yet been discovered in Indo-China.

G. C. L.

BLANCHARD (M.). i. **Inoculations expérimentales de l'Ulcère Phagédénique Tropical.**—*Bull. Soc. Path. Exot.* 1914. Feb. Vol. 7. No. 2. pp. 96-101.

LE DANTEC (A.). ii. **Priorité de la Découverte du Bacille du Phagédénisme Tropical et de la Pourriture d'Hôpital.**—*Ibid.* Apr. No. 4. pp. 262-268.

iii. *Ibid.* May. No. 5. pp. 376-380.

i. The author first refers to the association of fusiform bacilli and spirilla described by VINCENT and Le DANTEC, which is generally

admitted as the cause of phagedenic tropical ulcer. He states that the pathogeny of the affection is still uncertain. All attempts at inoculation have so far been followed by negative results. Le DANTEC in a single case produced in a guinea-pig an ulcer similar in some respects to phagedenic ulceration by placing a splinter of bamboo soiled with earth under the skin of the dorsal region. All other attempts, however, failed.

The phagedenic ulceration of the Congo, with which the present author has experimented, possesses all the clinical and microbiological characters of the classic description. He inoculated men and guinea-pigs. For the human inoculations a fragment of tissue about the size of a lentil was taken from the ulcerated area of a patient suffering from the disease. This was then divided into several pieces, all microscopically showing an abundance of fusiform bacilli and spirochaetes with very rare diplococci. Seven inoculations were made, chiefly where it was not likely for phagedenic ulceration to occur. In none of the cases was any reaction produced, all the small incisions cicatrising in three or four days without any trace of ulceration. Microscopic examinations also showed that the spirochaetes disappeared in twenty-four hours and that the fusiform bacilli were rapidly ingested by the phagocytes.

In another series of cases an aseptic necrosis was produced before the inoculation was made. Two drops of a very concentrated solution of potassium hydrate were placed about ten centimetres apart over the skin of the deltoid region. Five days after, as the points of necrosis did not present any trace of infection, one of them was inoculated with phagedenic material. By this means ulceration was produced, the discharge containing spirochaetes and bacilli. Further confirmation was obtained by the second necrotic spot, which had remained perfectly free of infection up to the eighth day, finally becoming infected through the soiled dressings which covered the first ulcer.

The inoculations in guinea-pigs were made after producing a local necrosis with potassium hydrate. The material inoculated was obtained from the same source as in the experiments described above. The result was negative. Ulceration took place at the point of chemical necrosis, but the germs found were not those of phagedenic ulceration, no spirochaetes nor fusiform bacilli being noted.

Blanchard's experiments then show that phagedenic tropical ulceration can be transmitted direct by contagion from man to man.

ii. After the reading of Blanchard's paper VINCENT protested against the name of Le Dantec being associated with his as regards the discovery. Le Dantec however now claims that he first saw a bacillus in 1884 in French Guiana in this condition, while VINCENT first described the spirillum which now goes by the name of *Spirochaeta schaudinni*. VINCENT, who joined in the discussion, said that the bacillus he called fusiform never has spores, whereas that described by Le Dantec apparently has.

iii. In the second paper Le Dantec returns to the attack and criticises VINCENT's remarks. He reprints his paper of June 1885 in the *Archives de Médecine Navale* to support his contentions, and still believes that his name should be given as one of the discoverers of the bacterial association which characterises tropical phagedoena.

G. C. L.

BERNARD (P. Noël). *Recherches sur la Pathogénie de l'Ulcère phagédénique des Pays Chauds.*—*Bull. Soc. Path. Exot.* 1914. Mar. Vol. 7. No. 3. pp. 176-179.

Phagedenic ulceration in Indo-China is similar in its clinical characteristics and microbiology to that seen in other parts of the Tropics. The author studied such a case both bacteriologically and experimentally. A coccus, strictly anaerobic, was grown, which when inoculated under the skin of guinea-pigs gave rise in five to six days to an abscess about the size of a nut with an indurative base. This gradually resolved and disappeared in about ten days. Intraperitoneal inoculation was negative, while inoculation under the skin of rabbits gave the same results as in the guinea-pig. Cultures made in Indo-China died out before they reached Paris two months later.

G. C. L.

HEYMANN. *Traitement par les Rayons X des Ulcères phagédéniques tropicaux.*—*Ann. d'Hyg. et Méd. Colon.* 1914. Jan.-Feb.-Mar. Vol. 17. No. 1. pp. 87-96.

After treating five cases of tropical phagedenic ulcer by X rays the author concludes that the rays exercise their most favourable action on the cicatrisation of the ulcers, at least of those which have not reached the deeper layers. The mode of treatment appears superior to others because it is followed by a rapid cure and by the disappearance of all pain in the first few days.

G. C. L.

WHYTE (G. Duncan). *An Undescribed Form of Ulcer met with in the Tropics, with Observations on its Treatment (Based on the Study of Eleven Cases.)*—*Trans. xvii International Congress of Medicine.* London. 1913. Sect. xxi. Trop. Med. & Hyg. Part. 2. pp. 83-85.

The ulcer is met with exclusively in old men. It is characterised by "(a) the rapidity of its spread by undermining and causing sloughing of the superficial layers of the skin; (b) the complete cessation of spread and the rapid healing of the ulcer upon treatment with a lotion (such as hydrogen peroxide or a solution of one of the permanganates) from which oxygen is set free."

Eleven cases were seen during the last six months of 1912, all amongst the male in-patients admitted to the Swatow Hospital, China, during that period. In nine the ulcer was on the leg, in one case on the fore-arm, and in another on the shoulder. [No bacteriological examinations seem to have been made of the condition, so it is difficult to say to what it is due.]

The best treatment was the application twice daily for three days of dressings saturated with hydrogen peroxide, this checking the spread of the ulcer. After this the application of mild ointments was soon followed by complete healing.

G. C. L.

CORLEIS. Beitrag zur Kenntnis und Therapie der Hautmaulwurfskrankheit. ("Creeping Disease" der Engländer und "Wolossjatik" der Russen). [A Contribution to the Knowledge and Treatment of Creeping Disease.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Apr. Vol. 18. No. 8. pp. 285-286. With 2 text figs.

While creeping disease is seldom seen in West Europe, it is however relatively frequent in Russia especially in the Ural district. The author quotes CASTELLANI and CHALMERS as saying that larvae of the genera *Gastrophilus*, *Oestromyia* and *Hypoderma* are found in different cases of this condition.

Corleis has twice obtained a larva from the cheeks of a patient whom he believed was suffering from this disease, and illustrates the same by photographs. Tincture of iodine was found to be of use in the treatment and proved more efficacious than drugs used formerly. [The author apparently has not had the larvae identified.]

G. C. L.

GOUGEROT & VOILLEMOT. A propos d'un Cas de Craw-craw : Traitement par l'Hectine et le Permanganate de Potasse.—*Bull. Soc. Française de Dermatol. et Syph.* 1914. Jan. Vol. 25. No. 1. pp. 22-27.

The authors first refer to our imperfect knowledge of the etiology and treatment of Craw-craw, a name first employed by EMILY to designate a dermatitis very common on the Congo and upper Oubanghi. They describe the case of a man 28 years of age who had a small abrasion on his right heel produced by the chafing of a new boot. Following this an excoriated papule appeared on the posterior aspect of the right calf, and a very painful abscess. The latter was incised at the end of March 1913, but suppuration persisted till the end of April. In June 1913 a third lesion appeared communicating with the two first. This rapidly ulcerated and became chronic, the patient then presenting the excoriated papule of classical craw-craw and deep ulcer. Other physicians who saw the condition were also satisfied that this was craw-craw. From the 12th November to the 1st December the wounds were cauterised with an equal solution of potassium permanganate while hectine was given by the mouth. After the exhibition of these drugs recovery quickly took place.

JEANSELME, who joined in the discussion on the paper, pointed out that the name "Craw-craw" is used for very different cutaneous lesions; sometimes for dry papules, at other times for ecthymatous conditions. He believes that the condition seen by EMILY on the Congo resembled oriental sore or tropical ulcer. On the West coast the natives have applied the term to pruriginous papules; in such papules filarial embryos were once discovered and named by BLANCHARD *Rhabditis Niellyi*.

[It is a curious and interesting fact that confirmation of the presence of these embryos in such lesions is still wanting.]

G. C. L.

ARGAUD (R.) & BRAULT (J.). Contribution à l'Etude de l'Anatomie pathologique et de la Pathogénie de l'Aïnhum.—*Bull. Soc. Path. Exot.* 1914. May. Vol. 7. No. 5. pp. 371-375.

The authors believe that it is more logical to explain the transverse

fissure which marks the separation of the toe as a result rather than as the cause of the osteolysis. They believe that certain nervous lesions which they have described permit them to bring forward the hypothesis of an initial medullary alteration. According to them ainhum is the result of a trophoneurosis at the point of the medullary disappearance, a trophoneurosis very limited, absolutely symmetrical, ending in osseous alterations just as in tabes.

The authors also studied leprous lesions in digits and came to the conclusion that the histopathology of these lesions is identical with that of ainhum. They do not however consider that it is necessary to conclude that ainhum is a manifestation of leprosy because identical lesions can result from different causes.

G. C. L.

CHALMERS (Albert J.) & CHRISTOPHERSON (J. B.). **Murmekiasmosis Amphilaphes.**—*Jl. Trop. Med. & Hyg.* 1914. May 1. Vol. 17. No. 9. pp. 129-135. With 3 plates.

The above name has been coined for a peculiar form of cutaneous wart characterised by its extraordinary facility for growth, which causes it to spread and to occupy practically the whole of the side of the face and neck. The name is derived from the Greek, *Murmekia*—anthill and *Amphilaphes*—spreading. GALEN invented the word "*Murmekiasmos*" from "*Murmekia*" to denote the breaking out of warts on the body.

Microscopically the points of interest about this curious wart growth are the presence of numerous cryptococci, and the fact that the lesions are largely composed of an adenomatous structure derived from the sebaceous glands. A similar disease has been seen in England, but LILLEY who described it does not mention the presence of cryptococci nor the connection of the growth with the sebaceous glands. As regards prognosis, the warts do not appear *per se* to endanger life, but they destroy adjacent structures such as the eye and, when they enter the pharynx, the larynx may also become involved. If freely removed they apparently do not recur. It is important that this should be done as early as possible and the authors recommend the prompt removal of any persisting warts on the face, especially if they have dated from early years of life and show a tendency to spread. A short account of the literature of the subject is given, and the article is illustrated with three plates, showing the clinical appearances in an infected individual, and photographs of the cryptococcus and the histopathology of the lesions.

G. C. L.

BARLOW (N.). **Impetigo Tropica.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914. May. Vol. 1. No. 11. pp. 789-791.

The author states that in Honduras and other places on the Caribbean Sea a skin affection allied to the impetigo contagiosa of temperate zones is seen. It is much more rebellious in its course than that condition however, and the prognosis accordingly is more doubtful. The lesions are caused by a staphylococcus and the eruption, which is commonly seen in children, appears in successive crops. The sites of predilection are in order, the legs, fore-arms, hands, feet, fingers,

thighs, arms, scalp and, in contrast to impetigo contagiosa, last of all the face. Each crop may number from ten to fifty lesions, while occasionally new lesions are formed near old ones by autoinoculation from scratching. In adults the disease seldom occurs and then usually only a single patch on the hand or foot or adjacent sides of two fingers.

If left untreated the disease may persist indefinitely. Various treatments have been attempted by the author; the most efficient are as follows:—

"1. Careful removal of crusts and horny layer above all vesicles and the margins of all patches, following by painting with tincture of iodine.

"2. Keeping all affected parts bandaged with a paste of powdered boric acid and glycerin, containing 2 to 4 per cent. ammoniated mercury; with daily gentle scrubbing and removal of the tops of vesicles.

"3. Gentle scrubbing with solution of mercury bichloride, 1-1,000, followed by ointment of ammoniated mercury, 3 per cent.

"4. 25 per cent. sulphur ointment.

"The first method is scarcely applicable to children, but is the quickest cure for the single lesions of adults. A patch is often completely healed in four days."

G. C. L.

LOISELET. *Acanthosis nigricans*. Un Cas vu à Madagascar.—*Rév. de Méd. et d'Hyg. Tropicales*. 1913. Vol. 10. No. 4. pp. 204-205. With 2 plates.

The patient was a native of the Tanala race inhabiting the dense forest in the environs of Ihosy. He was a man of about 30 years of age, strong and robust, but with a slightly enlarged spleen due to attacks of malaria. His skin lesions were limited to the neck and both axillae; they were painless. They had lasted for two years. The author describes them as follows. The skin was very much thickened and warty looking, the papillae being augmented in volume and showing a flattened surface. To the hand they gave the sensation of an irregular surface, but no definite roughness was perceptible. Between the flattened surfaces irregular furrows and fissures produced a complicated network. No ulceration was present. The colour was dark black, the lesions having lost, however, the lustre of the normal black skin.

JEANSELME, to whom photographs were sent, stated as his belief that the case was one of *Acanthosis nigricans*.

The symmetry of the lesions, their indolence, the integrity of the skin at the point of infection, the verrucose and papillomatous appearance, and the pigmentation all tend to confirm this.

[No microscopic examination of the lesions seems to have been made.]

G. C. L.

CHALMERS (Albert J.) & BYAM (W.). *Vaccine Lichen in Natives*.—*Jl. Trop. Med. & Hyg.* 1914. May 15. Vol. 17. No. 10. pp. 145-148. With 5 figs.

Two separate detachments of Nuers and Nubas were vaccinated, 24 on February 10th, and 36 on February 23rd, 1914, with a supply of glycerinated lymph derived from a calf which was obtained from the Laboratories of the Egyptian Public Health Department in Cairo.

The vaccinia developed well in all the cases, but eleven of these, i.e. eight Nuers and three Nubas, developed a peculiar eruption. "Some seven to nine days after vaccination the patient complained of a sensation of itching in various parts of the body, but most commonly at first on the forearms. This was followed in a few hours by an eruption of dark-coloured maculae, which quickly became papules. They appeared first upon the backs of the hands and forearms, then on the back of the neck, then on the face, chiefly on the forehead, the chest and back, coming out in successive crops. The number of these papules varied considerably in different cases from a few dozen to several hundred." The fully developed papule was about the size of a large pin head and was sharply dome-shaped.

After lasting for four to five days the rash slowly disappeared, leaving a well marked desquamation where the papules had been present. The general appearance of the eruption before the papules appeared was that of a lichen, but it did not conform to any of the ordinary described types of that disease. The treatment adopted was rest and quiet, together with an antiseptic ointment for the skin. Recovery on these lines was rapid.

G. C. L.

ANDERSON (D. E.). **The Uta Disease as seen in Peru in 1913.**—*Trans. xviii International Congress of Medicine*, London, 1913. Sect. xxi. Trop. Med. & Hyg. Part 2. pp. 309-310.

A description of the disease is given. It only thrives in high altitudes in Peru, in cold, damp, deep and narrow valleys up the eastern and western slopes of the Andes, 3,000 to 8,000 feet above the level of the sea. Its geographical distribution resembles in some respects that of *verruca peruana*. The author compares it with *gangosa*, and rightly points out that it is neither yaws nor leprosy. At the time when the paper was written the virus and carrier of the parasite was unknown.

[The Commission from the Department of Tropical Medicine of Harvard University has recently shown that this disease is a form of leishmaniasis (this *Bulletin*, Vol. 3, p. 142).]

G. C. L.

BENJAMINS (C. E.). **Over Naso-pharyngitis mutilans.** [On Naso-pharyngitis mutilans].—*Geneesk. Tijdschr. v. Nederl. - Indië*. 1913. Vol. 53. No. 4. pp. 584-603. With 2 plates.

The author proposes this name for a peculiar self-limiting destructive ulceration of the nose and soft tissues of the face, of which he met with four examples in the year 1902, when serving in the East Indies. The patients were all adult male natives and on account of their helpless condition were inmates of a hospital for incurables at Samarang. Photographs of the cases were taken at the time along with notes, with the intention of proceeding further with the subject, but circumstances prevented this and the author, on his return to Europe, now publishes his material for what it may be worth, for the benefit of others.

In all four cases the lesion began in boyhood, as an ulcer appearing on the nose, which gradually extended all over the face so as to produce

the hideous disfigurement shown in the photographs, along with loss of sight; but having extended thus far the process came to an end without any particular medical treatment, leaving a smooth cicatricial surface without any nodules. In its self-limiting nature such a process differs essentially both from lupus and leprosy and an examination for acid-fast bacilli in the mucus of the nose proved in every case negative. The larynx also in every case apparently remained exempt, or at least showed no symptoms to lead to its examination. From syphilis the condition differed in the total absence of lesions on any other part of the body. The author thinks that such cases are of the type described by LEYS and ZIEMANN under the term "Rhino-pharyngitis mutilans" (*Jl. Trop. Med.* 1906. Vol. 9 and elsewhere), and proceeds to discuss the literature of the subject upon this hypothesis. There is a good bibliography at the end of the paper.

[Rhino-pharyngitis mutilans, of which the above four cases are typical examples, is more commonly known by the name of gangosa. At one time believed by some to be a sequela of yaws, it is now more generally considered to be a disease *sui generis*, the causative agent being unknown. A good description of the disease will be found in CASTELLANI and CHALMERS'S "Manual of Tropical Medicine," 2nd edit., p. 1275 (G.C.L.).]

J. B. Nias.

STANNUS (Hugh Stannus). **Anomalies of Pigmentation among Natives of Nyasaland. A Contribution to the Study of Albinism.**—*Biometrika*. 1913. Oct. Vol. 9. Nos. 3 & 4. pp. 333-365. With 10 plates.

An interesting article on anomalies of pigmentation amongst natives. The author emphasizes the point noted by himself in all cases that in ordinary daylight in negro albinos the pupil appears black and there is no red colour seen as in European albinos. The explanation of this, he believes, lies in the fact that absolute albinism of the eye in negroes is very rare and that the amount of pigmentation present is sufficient to prevent a large light entry and reflexion. A note however appended by the Editor of *Biometrika* queries the correctness of this statement.

Cases of complete albinism are dealt with, histories of some being given. These he believes illustrate the following facts:—

- "1. Albinism is common among the natives of Nyasaland.
- "2. It is a family affection and often directly hereditary.
- "3. Varying grades of albinism are met with in the same family.
- "4. Almost every degree of albinism is met with.
- "5. The degree may vary with age.
- "6. A secondary laying down of pigment in the albinotic skin in spots is a not uncommon feature.
- "7. Albinism is very generally associated with an unusual development of the lanugo hairs and less commonly with mal-development of the teeth.
- "8. Piebalds are comparatively rare.
- "9. Spotlings are less rare.
- "10. There is a very definite class in which the spotling condition affects the penis only.
- "11. Widely distributed leucoderma is uncommon.
- "12. A localised form resembling that described by ZIEMANN is common, but intermediate cases between this form and a more generalised form are seen.
- "13. Some congenital cases of spotlings resemble exactly some cases of leucoderma."

The rest of the paper deals with a general discussion of the same subject, PEARSON's views and those of other authorities being quoted. Those interested in the subject should consult the original.

G. C. L.

DE NAPOLI (Ferdinando). *L'Opera del Medico in Libia a proposito delle Malattie Venereo-sifilitiche e Cutanee predominanti nell'Oasi di Tripoli e sue Dipendenze.* [Medical Work in Lybia on Syphilitic and Cutaneous Maladies prevailing in the Oasis of Tripoli and its Dependencies.]—*Giorn. d. Med. Militare.* 1914. Feb. 28. Vol. 62. No. 2. pp. 94-124.

Various syphilitic manifestations are described. The most frequently contracted venereal diseases, however, are gonorrhoea and soft sores. Of other skin diseases impetigo, folliculitis, furunculosis, leucoderma, toxic eczemas, pigmentary conditions, erythemas and insect bites are mentioned.

Pediculis capitis and *Pediculis pubis* are rare, but *P. vestimenti* is more common, the parasite often preferring the head to other parts of the body.

Scabies is frequent. Myiasis of different forms is met with as well as typhus, kala azar and plague. Dermatomycoses due to different species of tinea are sometimes seen. Two cases of leprosy were studied, one a black man showing the tubercular form of the disease and the other anaesthetic. Some cases of chronic ulcer may have been tropical ulcer and the author believes he may have seen yaws.

G. C. L.

PAPPATACI FEVER, DENGUE AND UNCLASSIFIED FEVERS.

PEIPER (Otto). Ueber Malariabehandlung mit Hydrochinin. Ueber Papatacifleber.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Apr. Vol. 18. No. 7. pp. 221-232.

Summer fever or Pappataci fever.—In 1910, MANTEUFEL observed a number of cases of fever at Daressalam which he concluded belonged to the group of dengue, summer or Pappataci fevers, and small biting flies said to be "*Phlebotomus*" were found in the houses. In 1912, he made a further communication on the same subject (this *Bulletin*, Vol. 1, p. 237). Since then the fever has been frequently observed and is now recognised by the Europeans there. The symptoms are, fever of three to seven days, having a sudden onset with headache, prostration, muscular and joint pains like those of influenza, with almost always conjunctivitis, photophobia, pointed tongue, loss of appetite and constipation. In February 1913, one case showed an eruption (character not stated). No parasites were ever found in the blood, and quinine and hydroquinine were tried without success. A short summary of the most typical cases is given, the diagnosis being variously recorded as 3 day and 7 day fever.

[Most of these cases appear to be similar to those commonly seen in Greece, Asia Minor, India, and the Far East generally, and are probably local types of dengue though possibly several forms of infection are included. More information is required before they can be called pappataci fever, though it is very probable some of them were.]

P. W. Bassett-Smith.

CLARK (W. S.). Report on Cases resembling Pappataci Fever, observed at Ibadan, S. Nigeria.—*Yellow Fever Bureau Bull.* 1914. Apr. 7. Vol. 3. No. 2. pp. 145-147.

The author states that as pappataci fever has not been described from Southern Nigeria he has brought forward an account of some short febrile attacks affecting Europeans on the Residency Hill at Ibadan, which simulate this disease as found elsewhere. Three cases were observed throughout, and two others were seen at the end of the attack. The chief points given are, a short severe fever with a sudden onset, severe back pains, red tongue, and an almost normal pulse with a moderately high temperature. He states that mosquitoes of many kinds were abundant, and that sandflies were numerous and sometimes troublesome in the evenings. There does not appear to be sufficient evidence either epidemiological or clinical that these cases were really pappataci fever. The diagnosis was arrived at from the fact that the author was the only European not attacked, though his bungalow was equally infected with mosquitoes, but he rarely saw a sandfly there.

P. W. B.-S.

SPAGNOLIO (Giuseppe). Sulla Epidemia di Febbre dei Tre Giorni osservata a Messina nell'Estate 1913 (Quarta).—*Malaria e. Malat. d. Paesi Caldi.* 1914. Mar.-Apr. Vol. 5. No. 2. pp. 125-127.

The presence of three-day fever has lately been frequently noted in the neighbourhood of Messina and it appears to be spread directly by

inter-communication between the various parts of Sicily, occurring often in an epidemic form. From an economic and social point of view, it is of considerable importance as has been pointed out by DE LUCA (this *Bulletin*, Vol. 3, p. 328), whose observations are confirmed by the author. That the disease is spread by phlebotomus there is little doubt; the destruction of these, therefore, is the most important prophylactic measure.

P. W. B.-S.

ROUBAUD (E.). *Parasitisme chez les Reptiles du Phlebotomus minutus Rond. var. africanus Newstead.*—*Bull. Soc. Path. Exot.* 1914. Jan. Vol. 7. No. 1. pp. 83-85.

In his description of *Phlebotomus minutus* var. *africanus*, NEWSTEAD showed that this variety had a wide distribution in Africa. The author brings evidence forward to show that it is abundantly present on the Ivory coast, and in Senegal. In the first area he observed a lizard at rest covered by the flies; the males were actively moving about on the scales but the females were more fixed with their abdomens distended with blood. This was a single instance only. In Dakka, Senegal, further evidence was obtained that these small flies have the habit of attacking reptiles. A large python in captivity was frequently noticed to have its back covered with the flies when it was at rest, and when moving these hovered as a cloud over it, to settle again when the snake was still. The bodies of the females contained blood, but the author was never able to find any blood parasites in them. He states that the common *Phlebotomus minutus* has been noticed to feed upon a species of gecko in India (this *Bulletin*, Vol. 2, p. 616).

P. W. B.-S.

KING (H. H.). *Observations on the Breeding Places of Sand-flies (Phlebotomus spp.) in the Anglo-Egyptian Sudan.*—*Jl. of Trop. Med. & Hyg.* 1914. Jan. 1. Vol. 17. No. 1. pp. 2-3.

Those who have studied the bionomics of the sandfly have generally found the larvae and pupae among damp stones, bricks, and tiles, or in caves and crevices of stone walls. The author some time ago found a single larva in the soil at Tokar, and he now records taking many in the soil of Khartoum from the garden of the Gordon college. He has also taken adult sandflies in crevices in rocks, in the beds of streams, and in holes of trees in the Bahr-el-Ghazal province, and in caves in the rocky hills two hundred miles south of Khartoum. In the northern desert they are sometimes found in enormous numbers far from any rocks, so that the soil may be an equally favourable breeding place. This is markedly the case in the cotton district of Tokar, where sleep sometimes is rendered impossible owing to the number of phlebotomus. It is probable that the flies can only breed in sandy soil which cracks on drying, into which the pregnant female descends to lay her eggs on the damp earth below the surface.

P. W. B.-S.

BIRT (C.). **Phlebotomus Fever and Dengue.**—*Brit. Med. Jl.* 1913. Nov. 15. pp. 1297-1298.

This is an abridgment of a paper already published. [See this *Bulletin*, Vol. 2, p. 614.] Attention is directed to FINLAY's experiments reported in the *Edinburgh Medical Journal* for the year 1894, in which he induced dengue-like attacks by the bites of *Stegomyia* infected with yellow fever.

G. C. Low.

TIMPANO (Pietro). **Sette Casi di Febbre Dengue a Bova Martina.**—*Malaria e Malat. d. Paesi Caldi.* 1914. Mar.-Apr. Vol. 5. No. 2. pp. 124-125.

The author describes seven cases of a disease resembling dengue, which he observed in September 1913 at Bova Marina (Reggio, Calabria). They were at first thought to be malaria, but the characteristic features of dengue were soon recognised. The pains in the back and limbs were severe, gastro-intestinal symptoms were marked and a morbilliform eruption appeared from the second to the fourth day followed by desquamation of a furfuraceous character with much itching. The onset of the fever was rapid, and the temperature fell when the eruption began to appear, the whole attack lasting about a week. In one case an inflammatory swelling of the parotid occurred, and in another bronchitis. The disease appeared when the weather was hot and damp at the time when malaria was common, but no parasites were present in the blood. It was probably introduced by a soldier from Libya or Tripoli; other similar small epidemics have been observed in Sicily, probably introduced in the same way.

P. W. B.-S.

MITCHELL (Douglas A.). **Seven-Day Fever of the Indian Ports.**—*Statistical Report of the Health of the Navy for Year 1912.* pp. 186-191. 1913. London: H. M. Stationery Office.

An outbreak of a short fever, conforming to the type of the seven-day fever described by ROGERS, occurred during December 1912, January and February 1913 in H.M.S. "Alert," on which the author was serving on the East Indies station. There were 20 cases and the symptoms as given were similar to those commonly seen in epidemics at Bombay, the primary and secondary rashes being particularly well marked, the secondary simulating that of rubella; excepting for the absence of arthritic pains they were those of dengue. The first eight cases were all mild, and were followed three weeks later by twelve others ten of which are described as severe. The duration of the pyrexia varied from 24 hours to ten days and the intermission was generally well marked, as also the relatively slow pulse. The differential diagnosis from measles is given very fully, and it is stated that dengue was easily excluded by the absence of joint pains.

[It is unfortunate that the temperature charts of the cases are not given in the published paper. This outbreak appears to be similar to the fever experienced in the "Manche," described below.]

P. W. B.-S.

GOUZIEN. *Fièvre indéterminée observée sur l'Aviso la "Manche" en September-October 1911.* [Clinique d'Outre-Mer.]—*Ann. d'Hyg. et Méd. Colon.* 1914. Jan.-Feb.-Mar. Vol. 17. No. 1. pp. 233-235.

An epidemic of a fever presenting some unusual features occurred on board the transport "Manche" on the Annam coast. Many of the cases were sent into hospital at Haiphong and from these the author has made his observations. The course of the fever was of a marked saddleback type, with sudden onset, flushed face, suffused eyes and ephemeral rash, but without any marked joint pains or secondary rash as in typical dengue; the whole attack lasted about a week. This was followed by a short period of marked prostration. No parasites were found in the blood and quinine had no curative effect. It is noted as somewhat extraordinary that the cases were restricted to the "Manche," yet this ship was in constant communication with the shore. At the hospital at Haiphong they were treated in the general wards. It appeared as if the intermediary host, *Culex fatigans* or other similar carrier, was only present in the ships. It is also noted that previously several similar epidemics classed as dengue have been described from the "Manche," especially one in 1907 which presented almost exactly similar clinical signs as this one of 1911.

[The fever appears to be identical with that met with in Indian ports and particularly with recurrent epidemics as experienced in the Indian Defence Flotilla at Bombay harbour, which have been variously described as seven day fever or dengue. This epidemic has been previously described by ROUCHÉ (this *Bulletin*, Vol. 2, pp. 616-617).]

P. W. B.-S.

WICK (W.). *Morbilloid.*—*Arch. f. Schiffs-u. Trop.-Hyg.* 1914. May. Vol. 18. No. 10. pp. 345-350. With 3 temperature charts.

Under this name the author describes a disease which has been recognised for a long time in German New Guinea and of which an epidemic occurred at Raboul, New Pomerania, off New Guinea, in 1913. HOFFMANN in 1902 reported a large number of cases of an acute exanthem. The first outbreak was considered to be a modified form of dengue, later it was thought to be more like measles, under which heading it now appears in almost all reports. The incubation is 5-8 days and the disease appears to be spread by personal contact. Adults are mainly affected and the symptoms differ from true measles. At the onset there is headache and lassitude with conjunctival catarrh and a tendency to haemorrhage into the lower lid, with bronchial catarrh and pyrexia; an eruption of small papules, which may be haemorrhagic, appears on the mucous membrane of the mouth, more especially on the palate. True Koplik spots are not present. Simultaneously or very shortly after, the general eruption of a maculopapular character comes out, first on the face, then on the trunk and arms, rarely on the legs; the amount of eruption is often very slight and it is followed by desquamation in about one fourth of the cases. Generally the disease runs a mild course, the patient feeling well by the end of the third day, but cough may persist.

The diagnosis has to be made from dengue, rōtheln and measles. Dengue has been frequently observed in the New Guinea area and has many similar characters, but the absence of joint pains excludes this.

The course of the disease is more severe than r  theln and less than measles. From the latter it differs in the absence of Koplik's spots, the rarity of the infection of children even when they come in contact with the natives, the shortness of the incubation, and finally in the fact that an attack of measles in childhood does not protect adults from this disease.

[The differentiation from dengue seems incomplete and one of the three charts given, said to be typical, shows a six-day course and the saddle-back character of dengue as found in the orient. Further information is required before this condition can be established as a separate disease, but that it is not measles is fairly certain.]

P. W. B.-S.

LUZZATI (A.). **Sulle Malattie Febrili osservate in Libia alla Base Navale di Tobruck.** [Some Febrile Diseases observed in Libya at the Naval Base of Tobruk.]—*Ann. d. Med. Navale e Colon.* 1914. Feb.-Mar. Anno 20. Vol. 1. No. 2-3. pp. 132-134.

These observations were made at the local military hospital, and concerned a force of 7,000 soldiers and 500 sailors. The following types of fevers were noted:—(1) Irregular continued fevers of an endemo-epidemic form, mostly benign in character, having either a predominance of rheumatic symptoms lasting 3-6 days, or intestinal intoxication signs generally lasting 5-10 days; (2) A dengue type of fever with marked muscular and arthritic pains, lasting about a week, but in some cases followed by a period of marked debility; (3) Typhoid infections. There were about 200 cases, of which 50 were slight. Great advantage is ascribed to the use of anti-typhoid vaccination. Malaria was absent from both the naval and military forces, though in November great numbers of mosquitoes were present—chiefly forms of culex. The sailors suffered very slightly in comparison with the rest of the force.

P. W. B.-S.

MARTELLI (Pier Nello). **Sopra un Caso di Febbre intermittente simulante Malaria in una Bambina affetta da Cistite.**—*Propaganda Antimalarica.* 1914. Feb. 28. Vol. 7. No. 1. pp. 15-18.

The only interest that this case has from a tropical medicine point of view is the question of diagnosis from true malaria of an intermittent fever associated with inflammatory conditions of the bladder, in infants living in a malarial district. The absence of malarial parasites in the blood, with a probable presence of a polymorphonuclear leucocytosis and the non-curative action of quinine should easily clear up the diagnosis.

P. W. B.-S.

VERRUGA PERUVIANA & OROYA FEVER.

BASSETT-SMITH (P. W.). *Blood Changes in Verruga and Oroya Fever.*
—*Trans. Soc. Trop. Med. & Hyg.* 1914. Feb. & Mar. Vol. 7.
No. 4. pp. 158-159. With 1 plate.

In the acute form of this disease very marked blood changes are observed, consisting of a great reduction in the number of the red cells with marked poikilocytosis, irregularity in shape and staining, and great numbers of nucleated forms. Reference is made to the peculiar bodies, first described by BARTON, in the red cells in this condition and the recent work by STRONG and his fellow workers is commented upon. This Commission have stated, as their belief, that verruga and Oroya fever are distinct diseases. They have confirmed BARTON's observations however and believe that his bodies are specific parasites. A plate showing these bodies is given.

G. C. Low.

WERNER (H.). *Ueber Verruga peruviana.*—*Dermatologische Wochenschr.*
1914. Ergänzungsheft zu Band 58 (Festschrift). pp. 144-149.
With 1 plate.

This is a rather more detailed account of a case which was described in a previous paper reviewed in this *Bulletin*, Vol. 1, pp. 727-728. An excellent plate is supplied which gives a very real idea of the appearances of the eruption. The condition has to be diagnosed from framboesia, local leishmaniasis and Bassewitz's angiofibroma cutis contagiosum. The latter is associated with fever, is much less severe, and its endemic distribution is different, being found further south than verruga.

P. W. B.-S.

ANDERSON (D. E.). *Verruga Peruana.*—*Trans. xvii Intern. Congress. of Med.* London. 1913. Sect. 21. Trop. Med. & Hyg. Pt. 2. pp. 147-150.

The greater part of this communication consists in a review of work that has been published on verruga, mostly by Peruvian doctors, but it is supplemented by observations made by the author on three cases seen in the hospital at Lima. The eruption was like that of severe small-pox in a late stage, and the papules were tender on pressure. Many of the patients return to their work after the eruption has appeared and hence probably disseminate the disease. The author quotes TOWNSEND's views on the active part played by a phlebotomus fly in transmitting Oroya fever, but he draws no distinction between the acute fever and the verruga disease, which have since been shown by STRONG and others to be separate affections. The comparisons made between phlebotomus fever of the Mediterranean, Oroya fever and verruga are very involved and do not throw further light on the etiology of the diseases.

P. W. B.-S.

TOWNSEND (C. H. T.). **On the Identity of Verruga and Carrion's Fever.**
[Correspondence.]—*Science*. 1914. Jan. 16. pp. 99-100.

The author states categorically his reasons for considering the two conditions as varieties of the same disease. Most of the statements are very controversial and his views are directly opposed to those of STRONG and his fellow workers, who have also studied the conditions. Further details are shortly to be published.

P. W. B.-S.

BOOK REVIEWS.

FANTHAM (H. B.) [D.Sc.Lond., B.A.Cantab.] & PORTER (Annie). [D.Sc. Lond.]. **Some Minute Animal Parasites or Unseen Foes in the Animal World.**—xi+319 pp. With frontispiece and 56 text figs. 1914. London: Methuen & Co., Ltd. [Price 5/- net.]

In the words of its authors "the aim of this book is to give a readable and popular, but accurate, account of the life-histories of some microscopic protozoal organisms that produce disease in higher animals, including man."

The book consists of sixteen chapters, of which thirteen are descriptive, each forming a short treatise by itself, and three deal with generalities.

The mode of treatment is eminently practical and unconventional, and undoubtedly is suggestive and stimulating; classification is subordinated to plot and pitch; the Protozoa that play a tragic part in the human drama are severally shown in their appropriate stages and settings; those that are less notorious are severally introduced as they stand in the grouping of the systematist. Thus are provided excellent dissertations of two kinds—epic and didactic; of the one kind are the chapters on Sleeping Sickness, Spirochaetosis, Malaria, Grouse-disease, Yellow Fever, Redwater and other Piroplasmoses, Kala-azar, and Bee- and Silkworm-diseases; of the other kind are the chapters on Amoebae, Ciliate Infusoria, Myxosporidia, and Sarcosporidia.

Of course, something has to be taken for granted or, at least, anticipated, in the due performing of the dramatic method; as where the spirochaetes are given substantive rank in the Animal Kingdom, and the unknown virus of yellow fever is dealt with in the body of the book, instead of in an appendix. Occasionally also the professed accuracy of the authors' aim has to be sacrificed to effect; as where the tsetse-fly is represented as "dropping maggots which rapidly become very like the foetid surroundings in which they live." The unrestrained dramatic method also leads sometimes to a certain amount of overstatement, which is profitable neither to the innocent reader nor to the good cause which it is meant to support; as where the spread of *Glossina* from Africa to India in "certain kinds of vegetable cargo" is alluded to seriously as a practical danger; or where the development of Southern India (of all places on this dull terrestrial ball) is represented as having been retarded by the destructive effects of Protozoa upon transport animals; or where the airy vision that sees Protozoa at the bottom of all the extinction revealed by the geological record is mentioned with respect and half approval.

But outside such concessions to the sick appetite of a sensation-loving age, the book, with its clear illustrations, well fulfils its programme.

A. Alcock.

SCHILLING (Claus) [Professor Dr.]. **Immunität bei Protozoeninfektionen.** [Immunity in Protozoal Diseases.]—In KOLLE & WASSERMANN'S *Handbuch der pathogenen Mikroorganismen*. 2nd edit. 1913. Vol. 7. pp. 565-606. With 1 text fig. [Verlag von Gustav Fischer in Jena.]

This monograph represents a most extensive survey of the whole field of immunity in protozoal diseases. The author has collected a great mass of clinical and experimental observations and has welded them into a homogeneous whole, thus presenting to the reader a clear conception of the extremely difficult problems which beset research in this domain. After reading this valuable article one's chief regret is that a large number of the publications cited in the text do not appear in the list of references.

At the outset Schilling draws attention to the fact that the investigation of immunity phenomena in protozoal diseases is hampered by a number of circumstances: thus (1) certain protozoa pathogenic to the human subject do not cause infections when inoculated into animals; (2) in the study of other organisms one is practically restricted to the investigation of the infection in animals which are not affected by the disease under natural conditions and frequently, in order to preserve the parasites, it is necessary to propagate them through a series of animals; such passages produce marked alterations in the biological characters of the protozoa; (3) only a proportion of the organisms can be grown on artificial culture media; (4) the natural mode of propagation of the infection frequently cannot be imitated in the laboratory, e.g. in the case of transmission by biting flies which live only in the tropics.

Fairly full knowledge regarding the immunity in protozoal diseases is practically restricted to that group of organisms which cause blood infections. Immunity phenomena may be grouped according as they occur (a) in an unmodified attack of the disease; (b) after treatment of the infection by means of chemotherapeutic agents; (c) as the result of vaccination with dead or attenuated organisms.

Immunity in the course of unmodified infections.

A characteristic feature of protozoal diseases, whether experimentally produced or occurring under natural conditions, is the incubation period. During this stage, in spite of progressive multiplication of the organisms, no prodromal symptoms occur, and the infected subject may be in perfect health. The attack may then set in and reach its height with extreme suddenness. The question as to the cause of the severe pathogenic effects which occur in many protozoal diseases is difficult to answer; in the case of certain trypanosome and spiroosome* infections, in which the parasites multiply rapidly, and are present in great numbers in the blood, a plausible explanation was that the host suffered deprivation of essential nutritive materials. This is not the true reason, however, since in dogs or horses infected with nagana trypanosomes the parasites, after being extremely abundant in the blood, may disappear, and the animals recover. [Where drug treatment leads to a chronic trypanosome infection in mice, the parasites may at some periods appear to be more abundant in the blood than they are at the time of death in untreated animals inoculated with the virulent strain.]

The substances which give rise to toxic effects are designated "paroxysmal toxins" by Schilling. He considers that the amount of such substances present in the body at a given time must exceed a certain minimum before any ill effects follow. These toxins practically do not act as antigens as is shown by the fact that, in untreated cases of malaria, paroxysms may occur with undiminished intensity for a period of weeks. [Certain bacterial toxins also fail to produce immunity; thus rabbits do not become immune to injections of the haemolysin produced by streptococci.] In how far the toxic phenomena may be of anaphylactic nature has not yet been determined. The existence of toxic substances in the bodies of the parasites has not been demonstrated with certainty. [UHLÉNTH and SEYDERHELM have recently found that suspensions of trypanosomes killed by means of a weak electric current are very toxic for mice.]

In certain protozoal diseases the first attack may terminate in death; this occurs only rarely in the human subject, e.g. sometimes in relapsing fever, but it is the rule in small animals inoculated with large numbers of highly virulent parasites. On the other hand, certain infections, like syphilis, are characterised by their extreme chronicity. In many forms of protozoal infection, if survival occurs, the attack ends abruptly by crisis, the parasites disappearing suddenly from the blood, as in relapsing fever and fowl spirosomosis. Accompanying the crisis parasitocidal antibodies have been found to appear in the blood. In rats infected with the parasites

* Schilling applies the term "spiroosome" to the pathogenic spirochaetes in general with the exception of *Treponema pallidum*; similarly "pirosome" represents any member of the piroplasma group.

of Russian relapsing fever, the antibodies can be demonstrated in the serum as soon as the spirochetes begin to diminish in the blood; thus the immune substances appear critically within a few hours. As GRABITSCHESKY first of all showed, the serum during convalescence from relapsing fever exerts a parasitocidal action *in vitro*. This observer found in the case of an infected monkey that the serum did not possess a powerful parasitocidal action until thirty-six hours after the crisis; four days after the crisis the serum was again practically inactive although the animal remained completely immune to reinoculation. [Such results raise a doubt as to whether the crisis and the consequent immunity to reinfection are due to precisely the same factors as those which operate in conferring passive immunity, or which produce parasitocidal action *in vitro*.] Whether phagocytes, especially the mononuclear cells, play any important part in the process of recovery from the attack is still a debated question. The termination of the attack is by lysis, not by crisis, in the majority of protozoal infections. The presence of parasitocidal antibodies in the serum of infected animals is a common occurrence in the course of many protozoal diseases, e.g. relapsing fever, trypanosomiasis, canine piroplasmiasis; on the other hand, it has been impossible to demonstrate such antistances in malaria and cattle piroplasmiasis. The antisera exert a protective effect, so that a normal animal when inoculated with a mixture of parasites and antiserum does not become infected; powerful antisera also confer passive immunity, and may even possess curative action. Parasitocidal antibodies can be developed by injections of killed organisms; thus dead trypanosomes may possess antigenic properties.

The identification of trypanosome species by means of parasitocidal immunity.—LAVERAN assumed that if an animal which had recovered from a trypanosome infection was inoculated with a second strain of trypanosomes and did not again become infected, then the conclusion was justified that the two strains of parasites belong to the same species; on the other hand, if infection occurred as the result of the second inoculation, then the two strains belong to different species. Schilling points out that this method of "cross inoculation" as practised by LAVERAN, is not perfectly valid, since in a number of instances the inoculations were carried out with strains of parasites, which had been propagated through other animals, a procedure which is known to lead to profound changes in the biological characters of the trypanosomes. In order to obtain conclusive results, Schilling suggests that all the inoculations should be effected by the bites of insects, which act as the natural transmitters of the infections under consideration.

A number of immunity reactions are found to occur with the blood serum of infected animals, viz. (a) precipitation of extracts of the parasites (trypanosomes); (b) agglomeration of trypanosomes—the addition of certain normal sera aids this reaction, e.g. that of the horse, pig, etc.; on the other hand human serum and the sera of some animals are inactive; (c) "attachement" appears to be related to agglomeration; when blood containing trypanosomes is mixed with leucocytes from an infected animal, the parasites become attached to the white cells—the phenomenon occurs with either dead or living leucocytes; (d) trypanolysis; (e) opsonins, which are thermostable; (f) complement deviating antibodies are found in the serum of animals infected with trypanosomes; thus a mixture of the infected animal's serum, along with an emulsion of trypanosomes, has the property of fixing haemolytic complement. Similarly the injection into healthy animals of dead trypanosomes gives rise to complement-deviating antistances. Such antibodies developed in the serum of infected or immunised animals are specific for the trypanosome antigens, and must be clearly distinguished from the property of giving rise to complement-deviation which the serum may exhibit when mixed with emulsions of certain lipid constituents present in normal tissues. The latter phenomenon, first observed in the case of syphilis (WASSERMANN, NEISSER and BRUCK), and since then recorded in other protozoal infections, is not an immunity reaction in the true sense of the term, as the reacting bodies in the serum do not operate along with constituents of the parasites. [Statements regarding the development of the property of giving a positive Wassermann reaction in the serum of animals, e.g. rabbits, infected with

protozoa must be accepted with caution, since it has been shown that many apparently normal animals may possess this character.]

These various antibodies are developed independently in the blood, and a serum which manifests one reaction in a marked degree may be devoid of the power of causing others; thus there is no necessary correspondence between the agglomerating and the protective action of the serum in trypanosome infections. It has been shown in the case of trypanosome infections that the antibodies are in general specific for the genus trypanosome, but frequently not for the particular species in response to which they have been developed. Accordingly, these reactions are of no constant value for the identification of species. There does not appear, however, to have been any considerable attempt made to separate principal reactions from group reactions by quantitative experiments. According to KOLLE and SCHATLOFF serum from cases of relapsing fever after the second febrile attack gives a complement deviation reaction which is of value for diagnosis, and also for differentiation of the type of spirosome causing the infection.

Autoagglutination. The serum, in cases of trypanosome and spirosome infections, has been found in many instances to possess an agglutinin for the individual's own red blood corpuscles (autoagglutinin). This phenomenon occurs most markedly at low temperatures—approaching 0° C. (YORKE). It may prove of considerable value for diagnosing the presence of infection with protozoal organisms.

Human serum in animal experiment has a marked protective action against infection with the trypanosomes of nagana and against *T. evansi*, *equinum* and *dimorphon*, and when the serum is injected into an infected animal the parasites undergo solution in the blood. This property resides in the globulin and is comparatively thermostable. No parasitocidal effect occurs *in vitro*, and the serum is said not to possess opsonic action. Against *T. gambiense*, human serum is without action and this fact will enable the parasite to be identified, e.g. when it occurs in animals which act as "reservoirs."

If recovery from the primary attack occurs, the further course of the infection varies, being dependent principally on the nature of the infecting agent. Thus complete sterilisation and immunity is the rule in South African East Coast fever of cattle, and in certain varieties of fowl spiro-somosis; in the former disease the immunity usually persists throughout life. In relapsing fever, cure accompanied by a certain degree of immunity occurs eventually after a series of relapses. On the other hand in malaria spontaneous cure, along with the acquisition of active immunity, takes place only in a proportion of cases; as a rule the infection persists in a more or less latent state, and the infected individual on further inoculation does not suffer from further symptoms of the disease; in fact such "super-infections," when occurring at sufficiently frequent intervals, have the effect of maintaining and intensifying insusceptibility.*

The immunity to malaria possessed by native peoples is to be ascribed to such latent infection; the primary inoculation probably occurs at an early age—Koch observed that as adult life was reached, the parasites were found with diminishing frequency in the blood—and insusceptibility is established by superinfections. Infection with tertian malaria, however, does not protect against the quartan type. It is obvious that the cases of latent infection act as a continual source of parasites, and are therefore a danger to the unprotected portion of the community.

To preserve the state of insusceptibility it is essential that superinfections should be repeated at short intervals, as happens in districts where the malarial season lasts throughout the year; in districts where malaria has merely a seasonal incidence the superinfections are interrupted for sufficiently long to prevent the maintenance of immunity. This explanation, however, may not be adequate to explain all the facts. In a number of other protozoal diseases also, cure in the sense of complete killing off of the parasites does not occur spontaneously; this is the case in pirosome

*The variety of mosquito which transmits the infection no doubt plays a part in determining the immunity, since it may affect the state of development of the parasites and their virulence.

infections in general and in trypanosomiasis and frequently also in syphilis. In these conditions such immunity as develops is of the non-sterilising type (EHRlich) or, as Schilling terms it, labile infection. The development of this state is due to mutual adaptation of the host and the parasite; the host develops antibodies to the protozoa, and at the same time the parasites accommodate themselves to the new conditions which arise when the antistances are produced. A variety of circumstances conduces to this result; thus the parasites are not all equally susceptible to the action of the serum-antibodies and, further, a proportion of the organisms are protected from the full effect of the antibodies by anatomical conditions, e.g. when they are lodged in the capillaries in certain tissues such as the bone marrow and lymph glands. The consequence is that a number of the parasites adapt themselves and a balance is established between the pathogenic activity of the organisms and the antagonistic mechanism of the host. Canine piroplasmiasis affords a characteristic example of this condition; the blood of a recovered animal remains permanently infective for susceptible dogs and the virulence of the parasites may even undergo no diminution. At the same time the host is immune to superinfection; in fact, as the result of repeated inoculations of such a "salted" animal with infective blood, its serum acquires a powerful protective action against virulent organisms which are not accommodated to the antibodies. The equilibrium which subsists between the host and the parasites is, however, liable to be upset at any time when the general vitality of the host is lowered; this is strikingly shown in cattle which have recovered from Texas fever, in whom over-exertion brings on a fresh attack of haemoglobinuria. In cases of diseases belonging to this group the rule probably holds good in general, that immunity to reinoculation exists only so long as there is a latent infection with living parasites present in the body; whenever cure has been effected, the individual again becomes susceptible to a fresh inoculation and responds with the characteristic symptoms of the disease.

The genesis of relapses. As has been mentioned in the case of labile infections, when the equilibrium between host and parasites is upset, fresh symptoms of disease appear; this is well-known in malaria. But in trypanosomiasis, malaria, syphilis, and especially in relapsing fever, recurrences take place apparently without any cause. The explanation is that those parasites which have survived the action of the antibodies elaborated at the time of the primary attack, themselves develop an immunity to these antibodies and thus become serum-resistant. Such a condition probably represents an extreme degree of the process of accommodation which leads to latent infection. When serum-resistant parasites divide the resulting individuals also are resistant, and the resistance persists when the organisms are transferred to another animal and proliferate similarly in its body. The following experiment illustrates these points—Two rats, A and B, are inoculated with the spirochaetes of relapsing fever (it is to be noted that the strain of parasites employed is propagated by successive passages through animals, the subinoculations always being made during the primary attack); after the primary attack in the rats has ended by crisis, A is bled and its serum preserved, B is allowed to live until a relapse occurs, then it is bled at a time when parasites are present in the blood. The infective blood of B is added to the serum of A and a mouse is inoculated with the mixture, the result is that infection occurs. At the same time a second mouse is inoculated with a similar mixture of the serum of A, along with infective blood, but the parasites in this instance belong to the original (unrelapsed) strain; this animal remains uninfected. It is obvious, therefore, that the parasites of the relapse-strain are insusceptible to the antibodies which have developed as a result of the primary attack and which are active towards parasites of the original strain. We owe especially to EHRlich and his collaborators the analysis of this most important phenomenon. EHRlich concludes that the parasites possess an apparatus of *nutriceptors* which enables them to take up nutritive materials. When the parasites are killed in the body of an infected animal, these nutriceptors act as antigens and cause the development of corresponding antibodies. These antibodies act by plugging the nutriceptors, so that the parasites are rendered incapable of assimilating food stuffs, and in consequence die of starvation; accordingly, the possession of antibodies

of this kind confers on an animal a true athreptic immunity. If parasites, which possess nutriceptors of type A, are subjected to the action of the corresponding antibodies in a degree insufficient to cause their death then, the nutriceptors being plugged and hence useless for purposes of nutrition, the parasites develop a fresh type of nutriceptor (B). This process may occur with great rapidity; thus EHRLICH, ROEHL and GULBRANSEN found that if trypanosomes were exposed to serum antibodies *in vitro* for a short time ($\frac{1}{2}$ -hour) they became serum-resistant as tested in animal experiment. In relapsing fever the parasites which develop at each relapse possess a fresh type of nutriceptor. Presumably a period is reached at which the power of the organisms to develop fresh types of nutriceptor is exhausted and then the infection dies out. But trypanosomes, *Treponema pallidum* and *Plasmodium malariae* can apparently produce an almost endless variety of nutriceptors, hence there is the possibility of an unlimited number of relapses. When parasites possess simultaneously several different types of nutriceptors, then in order to protect against infection by means of an antiserum it is necessary that antibodies to every type of nutriceptor possessed by the organism shall be present in the serum. When once a particular type of nutriceptor has been developed, the succeeding generations of parasites which arise by asexual division reproduce this acquired character; this holds good even if the parasites are transferred through a series of individuals. EHRLICH found that the species of the host affected the capacity of the parasites to develop fresh nutriceptors; in the mouse trypanosomes can develop a great variety of relapse strains, whereas in the rabbit their power is limited.

Immunity after treatment with chemotherapeutic agents.

The destruction of parasites within the body of an infected animal through the agency of a chemical compound leads to immunity and the development of antibodies in the serum. This subject has been extensively investigated in the case of experimental trypanosome infections. The antibodies are stated to appear in the serum with remarkable rapidity; thus in rabbits infected with nagana antibodies are said to have been found three hours after an injection of arsenophenylglycin. It is supposed, therefore, that the antibodies exist preformed in the tissue cells and are set free in some way by the drug. It has been found that when mice infected with suitable strains of trypanosomes are cured by drugs and are then reinoculated repeatedly at short intervals, a considerable degree of immunity can be produced (TERRY). So far, the practical application of this method is restricted since in few instances is it possible to cure man and larger animals by any known therapeutic agents.

Immunity following the injection of killed parasites.

Many attempts to immunise animals by employing killed trypanosomes have proved futile; TEICHMANN and BRAUN, however, have succeeded by means of parasites separated by the centrifuge and then dried and treated with toluol; Schilling also produced immunity by injecting parasites killed by means of tartar emetic. Only certain strains of trypanosomes, however, possess the immunising property in a marked degree. The immunity which results is not definitely specific for the particular species of trypanosome injected, since treatment with nagana trypanosomes protected against infection with dourine and mal de caderas, although not against *T. gambiense*. On the other hand, as might be expected, immunisation with a serum-resistant strain did not protect against infection with the original strain; similarly, injections of the original strain did not confer immunity towards the serum-resistant parasites. *In vitro* however, an antiserum to the one strain led to deviation of complement along with parasites of the other strain. Schilling concludes from these results that the action of an antiserum in animal experiment is essentially different from its effect in the Bordet-Gengou reaction, and that the antibody which causes complement-deviation in the test tube is distinct from that which, by its action on the parasites in the body of the infected animal, causes the development of serum-resistance. Should protective immunisation by means of killed parasites ever prove to be of practical value, the important question would arise as to whether serum-resistant strains are transmitted by insects under natural conditions. There are no experimental data available which bear directly on this point; but it is possible

that during the sexual cycle in the fly serum-resistance is lost, just as GONDER has demonstrated that a drug-resistant strain of *T. lewisi* ceased to be resistant after passage through the rat-louse (*Haematopinus spinulosus*) which is a natural transmitter of this trypanosome, and in which it undergoes sexual development. On the other hand, drug-resistant strains of *Sp. gallinarum* and *recurrentis* when passed through ticks (*Argas persicus* and *Ornithodoros moubata* respectively) were found to retain their resistance, thus suggesting that the spiroosomes, unlike trypanosome, do not undergo a 'sexual' cycle in the invertebrate host. [The part played by antibodies in bringing about cure in some protozoal infections was well shown in experiments in which GONDER infected fowls with a mixture of a salvarsan-resistant strain of *Sp. gallinarum* and a non-resistant strain. On treatment with salvarsan the result was complete cure, the drug-resistant parasites being killed off by the antibodies developed as a result of the destruction of the susceptible organisms by the drug.]

In the special section of his monograph, Schilling details the methods of developing immunity which have been practised in the various protozoal infections. The problem of elaborating procedures of practical value requires for the most part to be solved by future investigation.

C. H. Browning.

CALMETTE (A.) & BRUYANT (L.). *Intoxikationskrankheiten. 2. Vergiftungen durch tierische Gifte.* [Intoxication Diseases. 2. Animal Poisons.]—MENSE *Handbuch der Tropenkrankheiten.* 2nd Edit. Vol. 2. pp. 617-678. 1914. Leipzig: Verlag von J. A. Barth. [Mk.40; or Mk.42 cloth bound.]

As part of a practical Handbook of Tropical Diseases this particular treatise on infection by animal toxins is not at all easy to appraise. In so far as it includes an account, by an original master like Calmette, of the properties of the most important of these toxins, and of the theory of immunisation, it is not only authoritative in the highest degree, but is also important and interesting in other ways. But in so far as it does not include—though the matter is within its admitted purport—an adequate account, sufficient at least to facilitate recognition, of the animals that secrete the venoms, it appertains rather to the academy than to the forum, rather to the physiological laboratory than to the broad fields of practice, and furnishes an illustration of the argument that injuries due to the direct attacks of animals above the grade of Protozoa are more rationally discussed as a branch of applied zoology than in any other connection.

This deficiency is manifest even in the article on the venomous snakes, which forms the chief component of the treatise. Here we have indeed a clear and methodical account, in convenient compass, of snake venom—of its physical and chemical properties, of its physiological and pathological action on the blood and tissues, of the natural immunity exhibited to a certain extent by some animals, and of the artificial acquisition of immunity; and an equally satisfactory account of the antitoxic properties of the serum of the animals artificially immunised, and of the general principles of treatment by such antidotal sera—the specificity of the several sera, and the practical necessity of a multivalent serum for special countries being fully recognised. But when we turn to the sections on the structure, classification and geographical distribution of venomous snakes the masterly touch has vanished, and we become aware of extraordinary omissions, and also see loose statements that might perhaps be attributed to misapprehensions in translation, as well as signs of carelessness for which a translator can hardly be responsible entirely.

To mention but a few of the most obvious of the omissions only: The aggressive and dangerous *Echis carinatus*, which is one of the commonest venomous species of the drier tracts of South-western Asia, from Arabia and Persia to Cape Comorin, and is also as common in certain West African localities as it is in North-Eastern Africa, is here attributed merely to that limited part of its very wide range which happens to coincide with Egypt.

The big cobras of Tropical Africa are not mentioned, nor the deadly and aggressive *Dendraspis*, nor the aberrant—but extremely common—African viperids *Causus* and *Atractaspis*.

The rest of the treatise is composed of short articles, with separate bibliographies for each, on stinging Zoophytes, Sea-urchins, Mollusca, Spiders, Scorpions, Centipedes, Hymenoptera, and Fishes, and on the venomous secretions of Toads and Salamanders, Lizards, and the Duck-mole (*Ornithorhynchus*).

Among the Fishes the Sting-rays (*Trygonidae*) are not noticed—a most surprising omission, since of all the fishes that can inflict envenomed wounds, the Sting-rays are at once the largest and the most formidable, and in tropical seas and estuaries are by far the commonest and most widely distributed. All round the Indian coasts, for instance, the only fishes that are held in universal dread by fishermen, and that when captured are at once deprived of their terrible barbed poison-spine, are the Trygons and their kind.

Among the Mollusca that can inflict a venomous bite the Cones and Augers (*Terebridae*) are not mentioned—the bite of certain Cones being notorious; and by an oversight the bibliography of the venomous Mollusca is appended to the article on Worms.

A. A.

BAERMANN (Gustav) & ECKERSDORFF (Otto). *Atlas tropischer Darmkrankheiten*. [Atlas of Tropical Intestinal Diseases.]—viii + 56 pp. With 57 plates. 1913. Leipzig: Johann Ambrosius Barth. [Mk.80.]

The Atlas contains 57 plates, 43 of these being in colour, and the rest (14) photographs. Each has an explanatory text which describes the appearances seen and the pathological conditions found. The authors obtained their material from the Central Hospital of Petoemboekan in Sumatra and are indebted to Mr. Fritz SKELL for the illustrations, the latter after having accompanied Baermann to Sumatra staying there for a year and illustrating the work.

Of the diseases dealt with amoebic and bacillary dysentery, of course, come first, the appearances of these in acute and chronic forms being very well depicted. Examples are also given of mercurial enteritis and membranous colitis. Then come typhoid and cholera, haemorrhagic enterocolitis due to streptococcus, septic croupous enterocolitis and septic ulcerative colitis. Next syphilitic diseases of the bowel are dealt with, then tubercular affections, and finally the conditions produced by ankylostomiasis infection.

The text is well written and accurate and shows that the authors have a sound knowledge of pathology. The coloured plates are certainly the best that have so far been produced on tropical conditions. The Atlas should prove of great value for teaching purposes and tropical schools would do well to have a copy of it. The authors are to be congratulated on their valuable work, which must have involved great labour to carry it out successfully. For much of this, of course, the honour goes to Mr. SKELL. The standard of his work is high and his coloured plates are really excellent.

G. C. Low.

MANSON (Sir Patrick) [G.C.M.G., M.D., LL.D.]. *Tropical Diseases. A Manual of the Diseases of Warm Climates*.—Fifth Edition. xxiv + 937 pp. With 12 colour and 4 black & white plates and 239 text figs. 1914. London: Cassell & Co., Ltd. [Price 12/6 net.]

The fifth edition of "Tropical Diseases," Sir Patrick Manson's well-known work, has just been published. This has been revised throughout and enlarged, the number of pages, with the index, extending now to 937 in

place of 876 in the fourth edition. In addition to this increase in size, some extra coloured plates have been added besides four black and white plates, and many additional figures in the text. As regards the different subjects treated, Kala Azar and Oriental Sore now come under the heading of Leishmaniasis and two new subjects viz., Phlebotomous Fever and Rat-bite Disease are included. The appendix has been changed, SAMBON's classification of the protozoa giving way to a more simple one by BAHR, to whom the author acknowledges his indebtedness for assistance rendered in the preparation of this edition. A good part of the text is much as it was in the fourth edition, but work which has been published since then is incorporated where necessary. This makes the reading somewhat difficult in parts, but such a result could hardly be avoided unless the whole work were re-written. This might be advantageous in a future edition. So rapidly does our knowledge of Tropical Medicine advance that a new edition when it appears is already out of date. None of the new work published, for example, on the transmission of *Dermatobia cyaniventris* by means of mosquitoes (*Janthinomima*) [See this Bulletin Vol. 2, pp. 527-529 and Vol. 3, p. 274] is included. This forms one of the most interesting studies on adaptation which has recently appeared.

There are one or two misstatements which might be rectified. The old mistake of *Stegomyia fasciata* as a proper intermediate host for *Filaria bancrofti* is perpetuated though the error is mitigated by the words "probably occasionally" after it. Also on page 323, the author, speaking of plague in California, states that the flea, *Hoplopsyllus anomalus*, which infests squirrels and rats, acts as the carrier of the bacillus from one to the other. This is not strictly correct, the species being really *Ceratophyllus acutus*. Amongst other things one notices the separation of Blackwater Fever from Malaria and the inclusion of Siriasis as a special entity. Points however, such as these, in the re-writing of the work would probably be more critically dealt with. Some of the diagrams might also be improved, the small sketches of trypanosomes in the appendix, pages 902, 903 and 905, being of little use and filling up space. The coloured plate of the tsetse flies *palpalis* and *morsitans* seems to have suffered somewhat in reproduction, the contrast between the dark abdomen of *palpalis* and the much lighter abdomen of *morsitans* being scarcely shown. In nature these species are easily distinguished by their colour.

These are some points which are worthy of mention, but one thoroughly appreciates the difficulties of having everything perfect in a work covering so much ground and realizes that they are but small blemishes in what is a very valuable book. Being the pioneer work on recent Tropical Medicine one always looks forward with pleasure to reading each new edition as it comes out and one hopes that such a long space of time will not elapse between the fifth and sixth editions as has done between the fourth and fifth.

G. C. L.

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SLEEPING SICKNESS.

BRUCE (David), HAMERTON (A. E.), WATSON (D. P.) & Lady BRUCE. Description of a Strain of *Trypanosoma brucei* from Zululand. Part I.—Morphology.—*Proc. Roy. Soc.* 1914. June 4. Vol. B. 87. No. B 598. pp. 493-510. With 3 plates.

In an introduction the history of the strain is given. The trypanosome was obtained by Mr. A. W. SHILSTON from a mule naturally infected at Somkele in Zululand. After passage through various laboratory animals at Pietermaritzburg it was forwarded to Pretoria and thence by Mr. ROBERTSON to the Sleeping Sickness Camp at Kasu. The date at which the parasite was isolated from the mule is not given, but will be recorded in a subsequent paper.*

The Commission consider that this trypanosome is the same as that discovered by BRUCE in Zululand in 1894 and named *T. brucei* by PLIMMER and BRADFORD. The old Zululand strain is referred to as the 1896 strain, the new strain as the 1913 strain. The authors then quote passages from the original description of the 1896 strain by BRUCE and by KANTHACK, DURHAM and BLANDFORD indicating that the parasite was distinctly dimorphic. In 1898 the trypanosome was handed over to BRADFORD at the Brown Institute and named *T. brucei* by PLIMMER and BRADFORD in 1899. The authors write:—

"That the trypanosome named by PLIMMER and BRADFORD was the same as that sent to KANTHACK, DURHAM, and BLANDFORD in 1896, there can be no reasonable doubt. There was no other species of pathogenic trypanosome in any English laboratory at the time, with the exception, perhaps, of *T. lewisi*, with which there could be no confusion."

The 1896 strain is compared with the 1913 strain. Mr. SHILSTON had measured 400 individuals of the latter strain and the chart is reproduced in the present paper and compared with that constructed by the Commission from films of the old strain. The two curves are remarkably alike. Furthermore, when the action of the strains on various animals is compared the same likeness is seen. Hence the

* Assuming that this is the trypanosome described in SHILSTON'S "Notes on Zululand Trypanosomes," it was isolated towards the end of 1911 (*Trop. Vet. Bull.* Vol. 1, p. 277). A.G.B.

Commission concludes that "the strain of trypanosome which forms the subject of this paper belongs to the species *T. brucei*, a well marked dimorphic type of trypanosome."

The object of the present paper is to describe as fully as possible the morphology of this new strain of *T. brucei* from Zululand in order to try and prove its identity with the trypanosomes causing disease in man in Rhodesia, Nyasaland, and German and Portuguese East Africa.

The length of the trypanosome as found in the monkey, dog, guinea-pig and rat, 1,000 trypanosomes in all, is recorded in a table.

Table II. Average length of *T. brucei*, Zululand strain, 1913.

Species of Animal.	Number of trypanosomes measured.	In microns.		
		Average Length.	Maximum Length.	Minimum Length.
Monkey	160	21.2	31.0	12.0
Dog	260	21.5	32.0	16.0
Guinea-pig	30 [80 ?]	22.9	35.0	17.0
Rat	500	20.8	28.0	17.0

The paper is illustrated by numerous biometric curves. The first of these gives the distribution by percentages in respect of length of 1,000 individuals of the 1913 strain. "It is very similar to some of the curves taken from the Nyasaland human strain. . . . But, on the other hand, it is very unlike some of the others." Then follow four other curves constructed from films made on nine consecutive days of the infection in a rat. In each case 500 trypanosomes were measured but in the first curve the original strain was used, whilst the 2nd, 3rd, and 4th curves represent the trypanosome after it had been passed once, twice and thrice through *G. morsitans*. This work showed that three passages through *G. morsitans* had little or no effect in changing the character of the trypanosome as regards its distribution of length.

Finally two other biometric curves are given and compared—the one constructed from 2,000 individuals of the 1913 strain of *T. brucei*, Zululand, taken on nine consecutive days of the infection in four rats and the other from 2,500 individuals of the trypanosome causing disease in man in Nyasaland, the 'wild game strain,' taken on nine consecutive days of the infection in five rats. The two curves are undoubtedly much alike.

The average breadth measured across the broadest part of the trypanosome of the long and slender forms is given as 2.76μ , that of the intermediate varieties as 3.25μ , and that of the short stumpy forms as 3.53μ . Regarding the other morphological characters of the trypanosome the authors were unable to discover any difference from those of the human trypanosome of Nyasaland.

The following are the conclusions :—

"1. The trypanosome described in this paper under the name of the 'Zululand strain, 1913,' is the same species as that discovered by Bruce in Zululand in 1894; reported on by Kanthack, Durham and Blandford in 1898; and named *T. brucei* by Plimmer and Bradford in 1899.

"2. As regards its morphology, this trypanosome is absolutely identical with the trypanosome causing disease in man in Nyasaland, the *T. rhodesiense* of Stephens and Fantham."

[The conclusions of STEPHENS and BLACKLOCK are diametrically opposed to those of the authors (see this *Bulletin*, Vol. 1, p. 662).]
W. Yorke.

BRUCE (David), HAMERTON (A. E.), WATSON (D. P.) & Lady BRUCE.
Description of a Strain of *Trypanosoma brucei* from Zululand.
Part II.—Susceptibility of Animals.—*Proc. Roy. Soc.* 1914. June 4. Vol. B. 87. No. B. 598. pp. 511-516.

The pathogenicity of the Zululand trypanosome is described and compared with that of the Nyasaland *T. rhodesiense*. Details of the experiments are given in tables. A horse inoculated by Mr. SHILSTON at Pietermaritzburg died in 35 days with typical symptoms of nagana. Six oxen were inoculated but only two became infected; one of these died after 310 days and the other was alive at the end of a year when it had apparently recovered. Neither this nor the human trypanosome of Nyasaland therefore produces serious disease in cattle. Of seven goats four died on an average in 77.2 days (45-116), the remaining three were refractory. No oedema of the face or corneal opacity was noted. The Nyasaland trypanosome was rather more virulent in goats, killing them on an average in 41.8 days (19-72). Eight monkeys died, on an average, in 29.2 days (8-65); trypanosomes were always present in the blood, there was no oedema of the face or corneal opacity. Seventeen dogs died, on an average, in 18.5 days (12-26). In eight corneal opacity was a prominent symptom, and in two swellings of the limbs were observed. The duration of the disease in eight rabbits was 32.7 days (27-39). Guinea-pigs were less affected by the disease than rabbits and of the ten used four required to be inoculated more than once; average duration 43.7 days (15-89). Rats lived for an average of 27 days (10-58) with their blood swarming with trypanosomes and their spleens enormously enlarged.

The conclusion is:—

"The pathogenic action of *T. brucei*, Zululand strain, 1913, on various animals is so similar, not only in regard to the symptoms during life, but also in the post-mortem appearances and rate of mortality, to that of the trypanosome causing disease in man in Nyasaland, that it affords another proof that these two trypanosomes are identical."

W. Y.

BRUCE (David), HAMERTON (A. E.), WATSON (D. P.) & Lady BRUCE.
Description of a Strain of *Trypanosoma brucei* from Zululand.
Part III.—Development in *Glossina morsitans*.—*Proc. Roy. Soc.* 1914. June 4. Vol. B. 87. No. B. 598. pp. 526-531. With 1 coloured plate.

The chief object of this paper was to compare the development in *G. morsitans* of the 1913 Zululand strain of *T. brucei* with that causing disease in man in Nyasaland. Of seven experiments made with laboratory-bred flies three were positive and four negative. Two experiments made with wild flies were positive. In all 308 laboratory-bred flies were used and 47 infected flies found—15.3 per cent.

Table I.—Laboratory-bred Flies.

Date.	Expt.	No. of flies used.	Experiment positive or negative.	No. of infected flies found.	No. of days before flies became infective.	Temperature at which flies kept.
1913						
Feb. 11	1857	58	—	1		
" 17	1909	50	+	10	21	?
Mar. 11	1988	45	+	20	13	84°F. (29°C.)
" 17	1996	55	—	4		
April 25	2111	50	—	3		
May 26	2188	30	—	1		
June 23	2188A	20	+	8	14	84°F. (29°C.)

Details of the five positive experiments are given in a table. On an average 21 days elapse before the cycle of development of *T. brucei* Zululand, 1913, is complete in *G. morsitans* and the fly becomes infective. The results of dissection of the infected laboratory-bred flies are recorded in a table. In the first positive experiment (No. 1909) 10 infected flies were found; in three of these the salivary glands were swarming with trypanosomes, but in none was the labial cavity or hypopharynx involved. In the second experiment (No. 1988) 20 infected flies were found. In two the salivary glands were invaded and in one a few active trypanosomes were seen in the labial cavity and in another a few 'blood forms' were noted in the hypopharynx. In the third positive experiment (No. 2188A) eight infected flies were discovered one of which had the salivary glands swarming with trypanosomes. In none of the negative experiments was an infection of the salivary glands noted.

The type of trypanosome found in the gut and salivary glands of infective flies is figured in a coloured plate; they are identical with those found in the development of *T. gambiense* in *G. palpalis*.

The conclusions are:—

"1. *T. brucei*, Zululand, 1913, belongs to the same group as *T. gambiense* as regards its cycle of development in the tsetse fly.

"2. It has been shown that the trypanosome causing disease in man in Nyasaland also belongs to the same group.

"3. The cycle of development of the Nyasaland and Zululand trypanosomes in *G. morsitans* is so marvellously alike that it affords another reason for believing in the identity of these two trypanosomes."

W. Y.

BRUCE (David), HAMERTON (A. E.), WATSON (D. P.) & Lady BRUCE.
The Trypanosome causing Disease in Man in Nyasaland. Part III.
Development in *Glossina morsitans*.—Proc. Roy. Soc. 1914. June
 4. Vol. B. 87. No. B. 598. pp. 516-525. With 1 coloured plate.

All the laboratory-bred *G. morsitans* used in this experiment were hatched out of pupae obtained from captive flies, a slow and laborious process. The work was therefore rendered difficult by the small number of laboratory-bred flies which could be obtained; moreover flies bred from captive flies are not so strong and healthy as those hatched out from wild pupae.

Eleven experiments were performed with laboratory-bred flies and of these three were positive and eight negative; five were also carried out with wild flies, as no laboratory-bred flies were available, and all were positive. Details of these experiments are given in two tables. As each fly died it was dissected; several infected flies were found in the negative experiments which probably means that the flies were only infected and not infective. The number of flies used in each experiment was small owing to the difficulty of obtaining laboratory-bred flies. During the experiment they were kept in the laboratory at 84°F. (29° C.). Two hundred and eighty-seven laboratory-bred flies were used and 25 infected flies were found—8·7 per cent. Two hundred and fifty-five wild flies were used and 23 were found to be infected—9 per cent.

In another table further details of the eight positive experiments are recorded. An average period of 24 days was required to complete the cycle of development of the human trypanosome of Nyasaland in *G. morsitans*, the flies being kept at 84° F.

In the three positive experiments with laboratory-bred flies nine infected flies were found. The following table gives the results of the dissection of these nine flies.

Table V.—Laboratory-bred Flies. Result of the Dissection of the Infected Flies found in the Positive Experiments.

Expt.	Time, days.	Proboscis.	Proventriculus.	Fore-gut.	Mid-gut.	Hind-gut.	Salivary glands.
1003	33	—			+		—
1003	39	—			+		?
1723	30	—	+	+	+	+	—
1723	30	—	+	+	+	+	—
1723	48	—	—	—	—	—	—
2405	32	—			+		—
2405	33	—	+	+	+	+	+
2405	33	—	—	—	+	+	—
2405	33	—	—	+	+	+	—

Experiment 1723 is of especial interest and is reported here in full :—

"In Experiment 1723, three infected flies were found. The first and second had the alimentary tract swarming with flagellates, but none in the salivary glands. The third was found on dissection to be free from trypanosomes throughout. This is curious because this fly had been isolated in a glass tube as an infective fly, and had, when used alone on a rat and rabbit, infected both these animals. The fly remained alive in the tube for 13 days, and the only explanation that can be given is that in this case the trypanosomes disappeared absolutely from the fly some few days before its death. This was the first time this had been observed to take place, and it was thought to be a remarkable phenomenon and difficult to credit, until another example of the same kind was observed. It must, therefore, be held as probable that an infective fly, with presumably both salivary glands and alimentary tract swarming with trypanosomes, can lose all these flagellates and become non-infective."

In other tables are given the results of dissection of the infected flies found in the positive experiments with wild flies, and also those of the infected flies found in the negative experiments with laboratory-bred flies. In only one of the latter was invasion of the salivary glands by trypanosomes noted; why this fly did not infect the animal on which it fed it is impossible to state.

The technique employed in the examination of the flies was that already described (see *Sleeping Sickness Bulletin* Vol. 3, p. 241). The method of isolating infective flies and inducing them to salivate on a clean cover-slip was also made use of (see this *Bulletin* Vol. 2, p. 584).

The authors then describe the morphological characters of the trypanosomes found in the alimentary tract and in the salivary glands of infective flies. The developmental changes which take place are similar to those already described in the development of *T. gambiense* in *G. palpalis*. The authors write:—

"It is still a matter of speculation as to how they (the trypanosomes) gain access to the glands, but as described in a former paper there is no doubt that they are often thrown forward in to the proboscis during or just in the act of feeding, and may, under these conditions, be drawn into the hypopharynx and so reach their destination. These proventricular forms, however, have never been actually seen by the Commission in the hypopharynx."

The forms encountered in the gut and salivary glands are depicted in a coloured plate.

The conclusions are:—

"1. The trypanosome causing disease in man in Nyasaland belongs to the same group as *T. gambiense*, the development taking place in the alimentary tract and salivary glands, not in the proboscis, of the fly.

"2. The percentage of flies which become infected is the same as in *T. gambiense*, 8 per cent.

"3. The percentage of flies which become infective is about 1 per cent.

"4. The length of time which elapses before a fly becomes infective varies from 14 to 31 days, average 23 days.

"5. The infective type of trypanosome in the salivary glands—corresponding to the final stage of the cycle of development—is similar to the short and stumpy form found in the blood of the vertebrate host."

[This paper confirms and extends the work of KINGHORN, YORKE and LLOYD, see this *Bulletin* Vol. 1, p. 268.]

YORKE (Warrington) & BLACKLOCK (B.). The Identity of *T. rhodesiense* with the Trypanosome of the same Appearance found in Game.—*Brit. Med. Jl.* 1914. June 6. pp. 1234-1236.

In this paper, called forth by that of KLEINE, summarised in this *Bulletin*, Vol. 3, p. 415, the authors traverse ground familiar to students of this subject. They give the following summary:—

"In favour, then, of game being the reservoir of human trypanosomiasis in South Central Africa we have the following facts:—

"1. Human beings and game are known to be infected with trypanosomes identical as regards morphology, pathogenicity in laboratory animals, and their development in *G. morsitans*.

"2. The human trypanosome can be successfully inoculated into game.

"3. The peculiar sporadic occurrence of the disease in human beings suggests that they were infected from a widely spread reservoir of the infection (the game) rather than from one another.

"In conclusion, we submit that the hypothesis that man enjoys marked natural immunity and is in consequence to a great extent resistant to infection with this parasite affords a satisfactory explanation of the distribution of the disease, of its comparative rarity, and of the fact that Taute's attempt to infect himself failed."

The arguments of KLEINE are examined. He does not accept the assumption that the majority of human beings are resistant or only occasionally susceptible to *T. rhodesiense*, on the ground that if animals become infected with what is for them usually a non-infective trypanosome the infection invariably dies out quickly. Yorke and Blacklock rejoin that they have succeeded in breaking down the immunity of rabbits to infection with *T. vivax*, some dying of an acute infection

in from 5 to 20 days. [It should be noted, however, that the first attempts to infect rabbits failed entirely or "resulted in a temporary infection in which the parasites were exceedingly scarce and disappeared after a few days." It was only after the 38th goat passage that a fatal infection was produced. Can rabbits be infected with *T. vivax* by tsetse bites?] The authors rightly point out that in the case of human inoculation put on record by TODD, the trypanosome was more likely than not other than nagana. With regard to the natural resistance of man they point out that man exhibits a marked degree of resistance to infection with the genus *Trypanosoma* as a whole.

A. G. B.

KLEINE (F. K.), FISCHER (W.) & ECKARD (B.). Ueber die Bedeutung der Speicheldrüseninfektion bei der Schlafkrankheitsfliege (*Glossina palpalis*). (II. Mitteilung.) [The Significance of Infection of the Salivary Glands in Sleeping Sickness Tsetse Flies.]-*Zeitschr. f. Hyg. u. Infektionskr.* 1914. May 27. Vol. 77. No. 3. pp. 495-500.

In a previous communication (see this *Bulletin*, Vol. 2, p. 32), the authors showed that in *G. palpalis* infective with *T. gambiense* only the salivary gland parasites were capable of infecting when injected into susceptible animals and that inoculation of the gut contents, swarming with trypanosomes, did not cause infection. In this paper the authors consider the track by which the salivary glands become invaded. They considered that the most probable path was not *via* the proboscis but directly through the body cavity. If this were really the case trypanosomes should be demonstrable in the fluid of the body cavity, especially in those *Glossina* which are either just about to become infective or have just become so.

Laboratory-bred *G. palpalis* were fed four times on monkeys infected with *T. gambiense* and *T. rhodesiense* and subsequently on a healthy monkey until it became infected. When at least one infective fly was known to exist in a small batch all were killed with chloroform and examined. In order to obtain fluid from the body cavity a transverse slit was made on the ventral surface of the abdomen by means of fine scissors and from this a small longitudinal slit was directed upwards. Danger of injury to the intestine does not exist in the case of non-pregnant females as a considerable quantity of fat lies between the abdominal wall and the gut; it is advisable, however, not to make the examination less than 24 hours after the last feed. The fluid oozing out of the wound is taken up in a capillary tube and spread on a slide and fixed and stained. In the majority of cases, particularly in male *Glossina*, the abdominal wall was not opened with scissors but the legs were cut off quite close to the thorax. On gentle pressure fluid from the thoracic and abdominal cavities exuded from the wound. This method proved most satisfactory some hours after the last feed.

In all 215 flies were fed on infected monkeys and at least 21 were proved to be infective. In none of these were trypanosomes found in the fluid of the body cavity. In addition 207 flies were examined which, for more than 24 days, had been fed first on infected and then on healthy monkeys. It was not determined whether these had actually become infective, but 11 exhibited numerous trypanosomes in the intestine which showed that these were at least on the way to becoming

infective. In no instance was the body cavity fluid found to contain trypanosomes.

Before this systematic investigation was undertaken the authors had examined nine infected *Glossina* and had found trypanosomes twice in the body fluid by the abdominal incision method and once by the method of removal of the legs. They now consider that this was the result of faulty technique because mammalian blood cells can be seen in the legs of very feeble young flies which have been fed; such *Glossina* as these soon die.

The authors therefore agree with Miss ROBERTSON (see this *Bulletin*, Vol. 1, p. 267) that the trypanosomes invade the salivary glands from the gut by way of the proboscis.* The observation that only the trypanosomes in the salivary glands and not those in the gut are infective when injected into susceptible animals is in direct opposition to that of KINGHORN, YORKE and LLOYD (see this *Bulletin*, Vol. 1, p. 268). These authors found that the intestinal contents of infective flies were virulent in each case. The explanation of these different results is not clear; injury to the salivary glands during removal might cause fouling of the intestines with infective trypanosomes. [The work of ECKARD on *T. rhodesiense* and *G. palpalis* confirmed the observation of KINGHORN, YORKE and LLOYD that the gut contents were infective (see this *Bulletin*, Vol. 3, p. 26).]

The authors have modified their opinion that a larger proportion of infective flies are obtained by feeding on monkeys than on goats or sheep; it is immaterial what kind of mammalian blood is used for feeding the flies. Apart from climatic conditions are other unknown factors which may influence the point in question. In many places

*PATTON and CRAGG lay stress on the anatomical objections to this route. They write:—

“In the first place, the salivary apparatus of *Glossina* as of all Diptera, is entirely separate from the alimentary canal, the only point in common between the two being that they open at the prestomum, that is, at the extreme tip of the proboscis. Although the food channel in the proboscis and the salivary duct in the hypopharynx are in close apposition, they are quite distinct channels, and communication between the two is only established at their openings, if at all. It is clearly necessary, therefore, that the trypanosomes, if they do not penetrate the wall of the gut and make their way to the salivary glands from the outside, must pass up the food channel to the tip of the proboscis and then turn round the corner and make their way back in the reverse direction up the hypopharynx. In other words, they pass through the valvular proventriculus, up the empty and contracted oesophagus, through the pharynx and the connected sphincter muscles, which are specially designed to prevent the forward passage of the contents of the gut, and down the narrow channel between the labrum-epipharynx and the hypopharynx; they then turn directly backwards, past the valve formed by the patulous tip of the hypopharynx, up the salivary duct and through the salivary valve, designed to permit of only a forward flow of the saliva, and into the glands. Further, during all this time they must necessarily travel in the reverse direction to the normal flow of the contents; if a feed of blood is taken while they are passing forwards they will have to maintain their position against a relatively enormous mass of blood, quickly absorbed. If they have reached the salivary duct they will have to maintain their position against the flow of saliva.”

[Patton (Walter Scott) & Cragg (Francis William). A Textbook of Medical Entomology. 1913. London, Madras and Calcutta: Christian Literature Society for India, pp. 737-738.]

sleeping sickness does not advance in spite of favourable climatic conditions whilst there is the experimental evidence that it is very difficult or even impossible to infect *Glossina* with certain trypanosome strains.

From other experiments it appears that strains of *T. gambiense* which have recently passed through *Glossina* were especially suitable for infecting new *Glossina*, whilst on the contrary those strains which have existed for a considerable time in the vertebrate host no longer possess the power of infecting *Glossina* in the same degree. Reference is made to the work of BOUET and ROUBAUD who found that strains of *T. gambiense* and *T. brucei* taken by them from the Pasteur Institute to Dahomey were no longer capable of infecting *Glossina* (see *Sleeping Sickness Bulletin*, Vol. 2, pp. 351-353). Recently ROUBAUD found that the Zululand strain of nagana was incapable of infecting *Glossina* (see this *Bulletin*, Vol. 2, p. 245). This strain is monomorphic and has in the authors' opinion lost its short aflagellar forms during the course of the years it has been kept in the vertebrate host. The work of Miss ROBERTSON showing that it is these short forms which cause infection in *Glossina* is of especial interest (see this *Bulletin*, Vol. 1, p. 502).

W. Y.

QUANTZ. Ueber die ersten klinischen Symptome der Trypanosomiasis. [The First Clinical Symptoms in Trypanosomiasis.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. May. Vol. 18. No. 10. pp. 340-344.

Reference is made to ECKARD's paper on this subject (see this *Bulletin* Vol. 2, p. 346). This author holds that the onset of sleeping sickness is acute. QUANTZ then quotes a number of writers who state on the contrary that the onset is gradual. Fever, according to these authors, is an important symptom; it is, however, not prominent as one of the earliest symptoms of the disease, but in association with glandular swellings attacks of fever occur.

Definite knowledge of the commencement of sleeping sickness was first obtained by examination of a number of European patients. A series of such cases which have come under observation recently show that the beginning is not unnoticed and gradual but is marked by violent fever. The clinical histories are given of the first symptoms of the disease in 8 cases under observation at the Seamen's Hospital, Hamburg. In 5 of these there was a history of unmistakably acute onset, in one case the statements of the patient were very unreliable and in the other two the onset was complicated by malaria.

These observations therefore confirm those of ECKARD that the onset of sleeping sickness is acute with high fever.

W. Y.

VORWERK. Versuche mit Salvarsan bei Schlafkrankheit. [Salvarsan in the Treatment of Sleeping Sickness.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. May. Vol. 18. No. 10. pp. 329-335.

This paper is a record of 12 cases of sleeping sickness from the Tanganyika district of German East Africa which were treated with salvarsan. The patients were with two exceptions in the second stage

of the disease—glandular swellings but general condition good—one case was emaciated and weak and the other exhibited nervous symptoms. All the cases were previously untreated. The drug was given intravenously in doses of 4 gm. Each injection was, with a few exceptions, followed by a febrile reaction, which occurred 1–2 hours after treatment. There was also some headache and feeling of lassitude. Generally the reaction following the second injection was more marked than that following the first. In two cases the pulse was quickened up to 140–148 and in another there was vomiting, headache, diarrhoea and fever lasting 48 hours. The author gives details of two other cases in which there was collapse—death occurring in one of them—48 hours after a second injection of the drug.

The action of salvarsan on the trypanosomes was always immediate; the parasites had disappeared from the cervical glands in 45 minutes in some cases. In other instances the glands were punctured with negative results at intervals varying from 2–7 hours after injection. The trypanosomes disappeared from the peripheral blood quickly and completely.

The following summary of the results obtained is given:—

1. A single intravenous injection of salvarsan caused immediate disappearance of the trypanosomes from the glands and blood in cases of Tanganyika sleeping sickness in the second stage. [The author means by this patients in good condition with enlargement of the lymphatic glands.]

2. After a single, or repeated doses, in almost all cases relapses occur within periods varying from $\frac{1}{2}$ to 6 months.

3. In patients of the third stage, that is those in poor condition or exhibiting nervous symptoms, salvarsan is contra-indicated as dangerous to life.

4. In respect of permanent sterilisation salvarsan is of less value than atoxyl, as after the employment of the latter in cases occurring in Tanganyika lengthy relapse-free periods are not seldom observed.

W. Y.

LURZ (R.). *Heilungsversuche mit Salvarsan bei Schlafkrankheit.* [Treatment of Sleeping Sickness by Salvarsan.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. May. Vol. 18. No. 10. pp. 335–339.

An account is given of the result of treating 16 cases of sleeping sickness in German East Africa with salvarsan. As the patients were mostly in poor condition 3 gm. of salvarsan was given by preference and the dose repeated after 1–4 days. On certain occasions, however, 4 and 5 gm. was administered. The patients tolerated the drug differently; one case had 7 and another 5 injections without any symptoms, whilst in others there was occasionally a rise of temperature. Toxic symptoms were noticed on 6 occasions out of the 70 intravenous injections given. Immediately after administration, or after the lapse of 2 or 3 hours, rigors with a rise of temperature to 39–40·1° C. were noticed. These were accompanied by pains in the head, chest and abdomen, vomiting and in one case pain in the legs. After 5–6 hours the symptoms began to subside and in a day or two the patient had fully recovered.

At least once a week the blood was examined by the thick film method and also the cerebrospinal fluid of those in whom trypanosomes were found in the blood or of those who appeared worse. De-

tails of the number of injections and amount of the drug administered to each patient are given. In all instances the swelling of the glands diminished and the trypanosomes disappeared from them. The length of time which the patients have been under observation varied from $3\frac{2}{3}$ – $5\frac{1}{2}$ months.

Of the 16 cases one, in which trypanosomes were found in the cerebrospinal fluid, died. In 6 the trypanosomes reappeared in the blood but the general condition remained unchanged. One case became much worse without the reappearance of trypanosomes in the blood or in the cerebrospinal fluid. The remaining 8 cases were benefited and trypanosomes had not reappeared. In 4 cases trypanosomes always reappeared in spite of frequent injections of salvarsan. It seemed impossible to cure them with salvarsan. The two other cases which relapsed might possibly after more than 3 or 4 injections of the drug have been permanently sterilised. All 6 were subsequently treated with atoxyl and in only one did trypanosomes not disappear from the blood. Whether those in whom there had been, up to the time of writing, no relapse are permanently cured it is yet too soon to state.

No advantage was noticed by using salvarsan and mercury treatment in combination.

Repeated injections of salvarsan are useful in the treatment of sleeping sickness since such treatment sometimes causes the trypanosomes to disappear from the blood and the general condition of the patient is improved. Salvarsan can be employed with advantage in those cases of sleeping sickness which are complicated by syphilis or framboesia.

W. Y.

MESNIL (F.) & ROUBAUD (E.). *Sur la Prophylaxie des Trypanosomiasés.*—*Compt. Rend. xv Congrès International d'Hyg. et de Démographie.* Washington. Sept. 23-28. 1912.

In this paper the authors summarise the various measures which can be employed with the object of stamping out sleeping sickness and animal trypanosomiasis. They first discuss the suppression of the reservoir of the virus, and deal with such points as the isolation and segregation of infected human beings and the sterilisation of the peripheral blood of such persons by means of treatment. Referring to the game reservoir the authors consider that, except perhaps in Rhodesia and Nyasaland, little is to be hoped from the destruction of game.

In the next section they deal with the campaign against the *Glossina*; they point out that this varies to a certain extent according to whether the tsetse responsible happens to be hygrophil such as *G. palpalis* or xerophil as is *G. morsitans* or intermediate between these two—*G. longipalpis*. Writing on *G. morsitans* transmitted trypanosomiasis the authors write that 'destruction of the game ought to be recommended everywhere where animal trypanosomiasis is spread by these tsetses'.

The campaign against other insect carriers is next discussed. A large number of trypanosomes are not transmitted by tsetses. *Stomoxys*, *Tabanidae*, *Stegomyia* and *Mansonia* are all supposed to

play a part in the dissemination of trypanosomiasis. The various ways of attacking these flies are discussed.

Selection of resistant races. Animals which have recovered from trypanosomiasis acquire a resistance against re-infection. This fact is brought out in nature for it has long been established that indigenous races are more resistant to trypanosomiasis than are those imported. This applies especially in the case of ruminants (cattle, goats and sheep) and certain races are remarkable for their particular resistance. Unfortunately it does not hold in the case of the *equidae*.

The prophylactic measures which can be adopted to prevent the spread of dourine are next discussed and finally the authors consider the question of the protection of clean areas against infection.

W. Y.

TODD (John L.). The Prevention of Human Trypanosomiasis in Africa.—*Trans. xv. Internat. Congress on Hygiene and Demography*, Washington. Sept. 23-28. 1912.

This paper is a review of the measures which may be recommended with a view to limiting the spread of sleeping sickness. The author emphasises the importance of such means of attacking *G. palpalis*, and other flies responsible for the spread of sleeping sickness, as clearing the bush and screening of houses, trains and steamers, and the wearing of suitable clothing. As it is impossible altogether to prevent people being bitten by tsetse flies in districts where they exist, and as there is no method of exterminating the flies, the importance of preventing the entrance of trypanosomes contained in the blood of infected persons or animals into uninfected regions is evident. The disease is most virulent amongst populations newly subjected to it and the extension of sleeping sickness seems to be largely due to the increased movement of human beings about Africa resulting from increased trade. The recognition of cases of human infection is difficult. The author once more lays stress on the importance of enlargement of the lymphatic glands as a diagnostic sign. The value of segregation and treatment of infected persons is discussed. Referring to the other vertebrate carriers of the virus the author writes:—

“Many wild animals and all domestic ones can be infected with the human trypanosome. It will therefore probably be wise to destroy all wild animals near settlements, to make certain that domestic animals are uninfected and, by protecting them from fly bites, to prevent their infection.”

Todd then indicates various lines along which he considers research might with advantage be directed. “Work on the nature of the relative active immunity which sometimes exists in animals and men and on the questions connected with immunity should be fruitful.” Further knowledge is required on the bionomics of trypanosomes and what animals—mammals, reptiles, birds, or insects—can harbour them. More precise information regarding the development of the trypanosomes in the tsetse fly, and of the other insects in which development may occur, is urgently required.

With reference to the bionomics of *Glossina* the author writes:—
“Very little is known of any of the tsetse flies. Knowledge concerning the following points in particular is much needed for all of them: their

distribution, especially why tsetse flies, though occurring in the neighbourhood, are sometimes very persistently absent from localities apparently suited to them; their migrations and the influences determining their local increase and decrease in numbers; their seasonal variations; their natural enemies, both rapacious and parasitic; their food; the whole story of their reproduction in nature; the possibility of using traps for the destruction of adult flies."

In conclusion Todd points out that "wherever it is possible permanent methods of prevention such as deforestation and education of the natives should be employed in preference to temporary ones such as the depopulation of a district."

W. Y.

PRINCIPE. Report of Sleeping Sickness Commission in Principe, October and November, 1913.—Published as a Supplement to the "Gazette" of San Thomé and Principe on Mar. 2nd, 1914. [Translation forwarded to Foreign Office by Consul General HALL HALL.]

The authors* refer to the Report published last year (summarised in this *Bulletin*, Vol. 2, p. 574). The prophylactic measures now proposed include the following:—

(1) The isolation of all persons attacked on a fly-free part of Principe for some of the infected, and in the neighbouring island of Bom Bom for the rest; all expenses to be paid by the plantation owners. (2) The employment of sanitary brigades on their own special work, and no other. (3) The slaughter of animals as soon as the disease is detected. (4) The giving of 0.6 gm. atoxyl by injection to all *serviçaes* who are bitten, to be repeated 48 hours later. (5) All tsetse flies caught to be sent to the city with a note of the place where taken.

It was hoped that all the *serviçaes* attacked would have been isolated at the end of January 1914.

As evidence of the great diminution in the numbers of *Glossina palpalis* the following facts are given:—In Sundi plantation when the Commission began its work 9,000 to 10,000 flies were caught every month; in October 1913 the number caught was 938, and in November, 380. On the Porto Real plantation there was formerly a monthly catch of 6,000 to 7,000 flies; in October only 314 were caught and these on neighbouring property belonging to natives. In October 1912, 15,973 *Glossina* were caught in the island by the glue system, whereas in October, 1913, though the work was better organised, the catch was only 2,311. It is noted that land planted with cocoa trees is ill-suited for *Glossina* and that more than half the island is so planted.

In October and November, of 493 persons examined only five showed for the first time the presence of trypanosomes. Thick film preparations were formerly used; now centrifugal treatment of the blood, lumbar puncture, and experimental inoculation are employed when possible. In the two months 197 animals were examined; trypanosomes were found in five, three of which had been recently imported. In May, 1912, of 206 animals examined 40 were found infected. This is an index of the improved conditions.

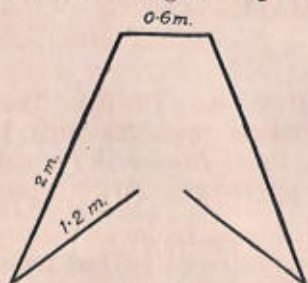
A. G. B.

* The Medical Mission consisted of Drs. BRUTO DA COSTA, J. F. SANTANA, A. CORREIA DOS SANTOS and GOMES DE ARAUJO ALVARES.

ZUPITZA (M.). *Versuche und Vorschläge zur Verbesserung von Glossinenfangmethoden.* [Experiments and Proposals for the Improvement of Methods of Catching Tsetse Flies.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. June. Vol. 18. No. 11. pp. 363-375. With 2 figs.

The author refers to the experiments of CLEVE with tsetse lime and the work done with this substance by KOCH and VORWERK. The flies, he thinks, are led to their victim by the senses of sight and smell, but the limed cloths tend to prevent the scent of man or animal reaching them. He has therefore proposed and carried out a modification of Maldonado's method, using a supporting substance having meshes which do not interfere with the scent. A sheet of metal gauze is worn by the fly-catcher suspended by straps from the shoulders, the back and front being thus covered; the gauze can be removed by the wearer so that he can pick off the trapped flies without assistance. The lime used came from Germany and smelt of resin. It has the appearance and consistence of honey and becomes fluid in the hot time of the day, so that it has to be renewed every two hours. It is insoluble in pure water. This apparatus was tried alongside the ordinary butterfly net, as is shown in a table. Adding together the catches of five days, 113 were caught by the net and 106 by the lime trap, or 100 to 94. The author notes that any tsetse flies which once came into contact with the lime would not escape destruction even if they did not remain on the trap, as the viscid substance would hamper their movements. He suggests wire made of iron with a mesh of about one centimeter; the simplest form would be that of a cylinder flattened before and behind, or a sort of shirt of mail.

He describes also a trap for use without lime. This consists of a cage two meters high having a wooden frame covered with metallic wire, the horizontal section resembling the head of an arrow with the tip cut off. The fly-catcher is inside. The wall opposite the tip consists of two portions like folding-doors projecting inwards, with a



slit between. If the flies come against any part of the wall, they buzz round and eventually pass through the slit and are easily caught or killed. The slit is not closed in any way. He suggests that the framework might be covered with thick muslin, which is easy to pack and carry. A table shows the results obtained with the wire apparatus. These are inferior to the butterfly net catches, but not greatly so. The apparatus has the disadvantage that it must be stationary, but this is useful in certain conditions. An animal may form the bait. [Such an apparatus would rarely serve its purpose as well as an expert and mobile fly-catcher.]

A. G. B.

NEWSTEAD (Robert) & DAVEY (J. B.). **Royal Society's Commission on Trypanosomiasis in Nyasaland, British Central Africa. First Preliminary Report on the Bionomics of *Glossina morsitans*.**—*Reports of the Sleeping Sickness Commission of the Royal Society.* 1914. No. 15. pp. 142-157. With 3 plates.

Professor Newstead left England on June 9th, 1911, and was absent for five months. His observations in Nyasaland, where he was joined by Dr. Davey, cover the period from July 18th to November 2nd. They were made in a district four miles south of Lake Malonge and near the Shire river. The physical features of the country are described; it consists of a broad alluvial plain. The dry season commences in May and lasts till the end of September. An interesting account is given of the vegetation of the river and its borders, the 'dambo,' and the forest or fly area. The forest is described as 'low forest'; the preponderating tree is the sanya (*Copaifera mopane* Kirk), the leaves of which are eaten by the mpala antelope. It is stated that the sanya tree, mpala antelope and *Glossina morsitans* are apparently correlative, that is to say, all are found together, but it is noted that elsewhere in Nyasaland *morsitans* occurs in the absence of sanya trees. Next comes an account of the vertebrate fauna of this district. Guinea-fowls are extremely numerous. Two were procured and tied up where tsetse were very common. The fly made no attempt to attack them. It was found that persons wearing khaki clothing were more attractive to tsetse flies than others. From counts made in which the ratio of the sexes was noted it was concluded that an increase in the number of females was due to very heavy rains. A few pupae were found, and it is considered that in this region breeding grounds are thinly scattered. A table gives the result of breeding experiments. It is noted that in this species of *Glossina* the wings do not completely overlap when the flies are at rest. Remains of tsetse flies were found in the common black drongo and in a small black and yellow throated bee-eater.

A. G. B.

GRAHAM (L. W.) & HUTCHISON (R. H.). **The Influence of Experimental Trypanosomiasis upon the Body Temperature of White Rats.**—*Amer. Jl. Trop. Diseases & Prevent. Med.* 1914. May. Vol. 1. No. 11. pp. 760-775. With 3 plates.

The normal ranges of temperature in healthy white rats was first determined. The thermo-electric method for temperature measurement was employed. This method depends on the fact that when a circuit is made of two metals a current of electricity is generated if the junctions are of different temperatures. The strength of the current varies with the difference in temperature and with the metals employed. A detailed description of the technique is given. Readings of body temperatures were made at short intervals over a considerable period of time. The animals were subjected to different external conditions, viz. room temperature, a temperature of 37° C. and refrigerator temperature. After determining the fluctuation of temperature in healthy rats under these external conditions, similar readings were again made after infection of the same animals. In the first experi-

ment, a series of readings was made every 15 minutes for a period of 24 hours before and after infection; in the second and third experiments readings were made every 10 minutes for 12 hours before inoculation and for as long after infection as the animal lived. The problem of keeping the couples in place in the lower intestine was of first importance. At first it was thought necessary to curtail the movements of the animals as much as possible, and with this object in view, the rats were kept in wire cones specially constructed to prevent their doubling up inside. Such restraint was found satisfactory for rats kept at room temperature and at 37° C., but in those cases where the animals were kept in the refrigerator the influence of the wire cone holder in preventing temperature regulation by its restraint upon muscular movement introduced an abnormal factor. This objection was obviated in the second and third experiments by placing the rats in separate cages. The wires were especially strengthened and the rats gagged.

The trypanosomes employed were for the most part pathogenic (*T. evansi*, *T. equinum* and *T. brucei*), but in the first experiment *T. lewisi* was used.

The following are the conclusions:—

"1. In white rats experimental trypanosomiasis causes no rise in body temperature.

"2. Pathogenic trypanosomes of high pathogenicity seem to decrease the power of thermal regulation in white rats under the influence of prolonged cold; but the non-pathogenic form, *T. lewisi*, does not show this effect.

"3. In white rats at ordinary temperature and under the influence of prolonged heat, none of the trypanosomes used in these experiments had any effect upon thermal regulation.

"4. From observations made upon the blood of infected rats it seems that conditions of prolonged heat and cold may possibly decrease the virulence of pathogenic trypanosomes without diminishing their pathogenicity."

W. Y.

TERRY (B. T.). i. The Influence of Heat upon the Toxicity for Trypanosomes of Blood containing Transformed Atoxyl.—*Jl. of Pharmacology & Experim. Therapeutics*. 1913. Mar. Vol. 4. No. 4. p. 361.

ii. Variations in the Toxic Effect of Transformed Atoxyl on Trypanosomes in vitro Caused by Altering the Number of the Organisms.—*Ibid.* pp. 361-362.

i. If a solution of atoxyl in blood be incubated at 37° C. for 2 or 3 hours a substance (transformed atoxyl), which is toxic for trypanosomes, is formed. This disappears to a large extent on heating to 70° C. whilst, if the solution be then heated to 100° C., it is found to be almost as toxic as if it had not been subjected to any heat at all.

The author writes "The evidence at hand indicates that heating to 70° C. for a short time causes the toxic substance to be taken up by the red blood corpuscles, while heating to 100° C. liberates it more or less completely. The liberation of the toxic substance is more complete after half an hour at 100° C. than after ten minutes."

ii. Experiment showed that the influence of the toxic substance (transformed atoxyl) upon trypanosomes varied inversely with the number of organisms present. From this observation the author concludes "(1) that the trypanosomes in suspension should be comparatively few if slight degrees of toxicity are to be detected and (2) that a standard number of trypanosomes should be employed if great accuracy in comparing results obtained with different suspensions is desired."

W. Y.

MALARIA.

DARLING (Samuel T.). **Studies in Relation to Malaria.**—Isthmian Canal Commission Laboratory of the Board of Health, Department of Sanitation. Second Edition. 42 pp.

The paper comprises a full account of malaria in the Canal Zone. The matter is divided under several headings.

1. *The Anophelines of the Canal Zone.*—These are *Anopheles argyrotarsis*, *A. tarsimaculata*, *A. gorgasi*, *A. albimanus*, *A. cruzii*, *A. apimaculata*, *A. punctimaculata*, *A. malefactor*, *A. eiseni*, *A. franciscanus*, *A. pseudopunctipennis*.

The commonest species are *A. albimanus*, *A. pseudopunctipennis*, and *A. malefactor*. Only one specimen of *A. gorgasi* has been taken. Naturally the predominance of a species varies from season to season and from place to place. In certain villages *A. albimanus* only will be found and at Ancon in 1908, 27 per cent. of the anophelines were *A. malefactor*, 72 per cent. *A. albimanus*. *A. eiseni* and *cruzii* are tree-living species; it would have been of considerable interest to determine the efficiency of these latter as regards malaria, but it was almost impossible to obtain larvae, and amongst the hundreds of insects caught within quarters and barracks no adult specimens were ever seen. It is, therefore, extremely unlikely that they play any part whatever in the transmission of malaria in the Canal Zone.

2. *Collection of larvae.*—Larvae were forwarded daily to the laboratory by the sanitary inspectors, and subsequently were transferred to glass moist jars partly filled with fresh water, care being taken to remove predaceous larvae, such as those of the dragon fly. The mosquito larvae were further transferred to feeding tanks containing algae and organic debris. It was found essential to keep the water in the breeding tanks fresh and free from fouling by injecting a jet of air through it by means of a Pacquelin cautery bulb provided with a heavy glass perforated tip; the temperature of the water in these tanks ranged between 72°–84° F.

3. *Breeding out. Methods of feeding.*—Pupae were separated in the morning and evening and placed in breeding-out tubes half filled with water and plugged with cotton, the newly emerged mosquitoes being subsequently transferred to biting jars. The best kind of jar for this purpose was a lantern chimney covered at both ends with crinoline gauze, fastened with adhesive plaster and a strong rubber band. Inside the jar was placed a circular ring platform of stiff paper as a resting place for the mosquitoes. About 20 mosquitoes were placed in such a jar over a small dish containing water and a raisin or date for food. The jar would then be placed on a shelf in a dimly lighted place protected from ants by kerosene cups. It was found that Anophelines thrive much better if given one or two preliminary blood meals before being fed with dates and raisins. In several experiments it appeared that yeasts and bacteria flourished to such an extent in the midgut of banana-fed mosquitoes as to prevent the development of zygotes in susceptible insects. In one experiment a patient, whose blood contained almost as many crescents as leucocytes, was bitten by four species of mosquito, three of these being

susceptible species, yet none became infected. This failure is attributed to the banana diet. Raisins and dates should always be used for keeping mosquitoes alive.

4. *Biting and infecting experiments.*—It was found most convenient to conduct the feeding experiments at 4 p.m., and on these occasions it was generally necessary to cover the jars well with a thick towel. Female mosquitoes several days old which had been fed exclusively on dates and raisins would generally bite greedily and would feed on successive or alternate nights if given an opportunity. Various devices for inducing the mosquitoes to bite proved serviceable. Tapping the jar and pointing it at a light at the end of the room serves to dislodge the mosquitoes and induces them to congregate on the gauze at the illuminated end, the patient's arm can then be carefully interposed and placed on the gauze, when the mosquitoes generally commence to feed.

The jar is then removed to a laboratory, one of the gauze covers is removed and replaced by a card which is slipped out when the jar is placed in a Petri dish cover containing water and raisins; under these conditions Anophelines may be kept alive for two or three weeks.

At the time of biting the patient, two or three good blood films were taken and differential counts made and the proportion of gametes to leucocytes estimated; by these means it was possible to estimate the number of gametes ingested by the mosquito in feeding.

5. *Estimation of gametes.*—The estimation of the number of gametes per cubic mm. of patient's blood, which is approximately the amount ingested, gives an idea as to the grade of infection to be encountered in any particular insect. The amount of blood ingested by each individual mosquito, as estimated by weighing the insects before and after feeding, was found to be approximately .0008 gramme.

Assuming the specific gravity of the blood in malarial fever with slight anaemia to be 1.050, then $105 : 100 :: .0008 : .000762$ = volume of .0008 gramme of blood. Now if there were 22 gametes per 100 leucocytes and 6,500 leucocytes per 1 cmm., there would be 22 by 65 by .761 = 1,088 gametes ingested. If under the most favourable circumstances there are an equal number of male and female gametes there should have been after three feedings 1,632 zygotes in the mosquito's midgut. As a matter of fact there were only 50, showing a loss of about 97 per cent.

This may be partly explained by the observation that *in vitro* 50 per cent. of gametes are taken up by polymorphonuclear leucocytes.

6. *Care of mosquitoes after feeding.*—The mosquitoes may be fed nightly or every other night with blood, or, if it is desired to ascertain the rate of development of zygotes they are fed on dates after a single feed of blood. The live insects should be preserved in jars and given fresh food and very little water, just enough to favour oviposition and to moisten the air.

Chloroform and cyanide are useful for killing; the latter is preferable as it causes the mosquitoes to spread out their wings and thus renders identification easier.

7. *Method of examining for zygotes and sporozoites.*—Successful dissections can only be obtained with freshly killed specimens. If an

absolute identification of the mosquito cannot be made at the time, all parts excepting the abdomen must be preserved intact and identified later.

8. *Description of the malaria parasites in the mosquito.*—Fifty per cent. or more of the gametes were ingested by polymorphonuclear cells in the mosquito's stomach and thus reduced materially the number of fertilized ookinetes. The earliest forms of the aestivo-autumnal zygote were detected in the gut wall after the expulsion of the blood meal, or after $2\frac{1}{2}$ days.

Measurements of the zygote and oocyst at varying periods of development show that the benign tertian parasite increases from 12 to 16.5μ in diameter on the 4th day to 48μ on the 9th day, after which sporozoites are found in the salivary glands; the subtertian parasite increases from 5μ (on the 2-5 day) to 30μ on the 12th.

The tertian zygote differs from the subtertian firstly in the rapidity of its development and in the finely granular character of the contained pigment.

In the salivary glands sporozoites were found only in the lumen of the duct, their long axis lying parallel to it. Out of several hundred mosquitoes used in the experiments it was found that 70.2 per cent. of *A. albimanus* became infected, 60 per cent. of *A. tarsimaculata* and 12.9 per cent. of *A. punctipennis*. *A. malefactor* was found to be refractory.

It was concluded from these experiments that *A. albimanus* is the chief transmitter of aestivo-autumnal, and of tertian malaria in the Canal Zone. Specimens infected with the tertian parasite became infected eleven and one half days after the first feeding with the subtertian on the eleventh day after.

It would appear that fecundation and development of ova are not necessary for the development of zygotes.

9. *Limits of infectiousness of man. The zygote carrier.*—In order that a recommendation might be made for the more complete treatment of patients who were discharged from hospital after their temperature had become normal and when their peripheral blood contained more than a sufficient number of gametes to infect susceptible mosquitoes, it was determined to fix the limits of infectiousness of such individuals.

The limit determined was about one gamete per every 500 leucocytes or 12 gametes per 1 cmm.

Darling concludes that the small amount of quinine circulating in the patient's blood from a prophylactic dose of 30 grains a day inhibits to a certain degree the growth of the zygote in the mosquito.

10. *Notes on the bionomics of some of the Anophelines studied.*—The incubation period of ova of *A. albimanus*, *A. pseudopunctipennis* and *A. malefactor* was estimated at thirty-six hours under laboratory conditions, the temperature of the air and water ranging between 78° and 82° F. daily. The eggs when first laid are quite white, becoming black in a few hours.

The larval period varies with the species, food, efficient temperature, sunlight and environment. *A. albimanus* larvae pupated within twelve days, while *A. malefactor* required sixteen to twenty days.

A. albimanus is well fitted for the purpose of transmitting malaria in the Canal Zone; it is the commonest and hardiest species, breeding

in a variety of locations, such as pools, margins of streams and collections of rain water. In the dry season it may be found in the stinking water of sewage streams, brackish marshes, meadows, muddy pools, crab holes etc.

11. *Identification of larvae.*—The chief differentiating characters of the larvae of the common Anopheles of the region are given.

It is then stated that a blood meal seems to be essential for the development of the ova of Anophelines, as in vegetable-fed insects no development of the ovaries appears to take place. In general the effect of an irritating toxin or otherwise noxious fluid on mosquito larvae is to hasten their pupation. None of these larvae will develop in salt but do so rapidly in brackish water.

12. *Experiments with larvicides.*—A number of experiments were carried out for the purpose of finding a cheap and efficient preparation. Crude petroleum was frequently found to be too viscid to have a spreading power of high efficiency, but when mixed with crude carbolic acid this power was much increased.

Anopheline larvae were found to be slightly more resistant than those of Culex.

Copper sulphate is inimical to larvae in a dilution of 1 in 50,000 parts, and to algae in a dilution of 1 in 500,000.

13. *Fumigation experiments with pyrethrum.*—Pyrethrum is burned in iron pots covered at the bottom with a layer of sawdust 2 or 3 inches thick, thus causing complete ignition of the powder. By this method mosquitoes, when exposed to the fumes for two hours, may be killed with quantities of pyrethrum less than one-third of that required by the United States army standard.

14. *Composition and size of mesh of wire screening.*—The two factors of importance in the use of wire screening for protection against mosquitoes are the size of the mesh and the chemical composition of the wire used.

After a number of experiments with live mosquitoes of many kinds a No. 16 wire mesh (16 holes to the inch) was found to be most satisfactory.

Observations over a period of eight years have shown that a wire made of copper, zinc and iron in the following proportions has given the best results and most effectually resists corrosion. Copper 84·83; Zinc 14·9; Iron ·06 parts.

15. *Effect of quinine on the malaria parasite in man.*—A number of experiments were undertaken in order to estimate the effect of daily doses of quinine on the number of gametocytes in the blood. It was found that with a daily dose of 10 grains of quinine, a gradual but steady decrease in the number of gametocytes and even of crescents took place. With the disappearance of the gametes a contemporaneous decrease in the polymorphonuclear and a rise in the mononuclear elements was noted.

16. *Latent malaria amongst the labourers and their families.*—A blood examination of all Spanish labourers was undertaken in March 1909, during the dry season when very few mosquitoes were breeding. Two per cent. were infected with some form of malaria parasite. It was

surprising to find cases in whose blood no parasites could be found, but who subsequently developed fever.

A complete investigation of all labourers at work and living in screened quarters revealed 9 to 13 per cent. of latent malaria, chiefly of the tertian variety; amongst children and adults living in non-screened or recently screened barracks, the percentage of latent malaria was much higher.

[All workers interested in malaria should not fail to consult this original paper.] P. H. Bahr.

VON EZDORF (R. H.). i. **Malarial Fevers in the United States.**—*U.S. Public Health Rep.* 1914. Apr. 10. Vol. 29. No. 15. pp. 871-877.

ii. **Malarial Fevers. Prevalence and Geographic Distribution in Alabama.**—*U.S. Public Health Rep.* 1914. May 1. Vol. 29. No. 18. pp. 1073-1083. With 2 maps.

i. This paper embodies rather a superficial survey of the prevalence and distribution of malaria in the United States, and represents a summary of results obtained in Alabama, Arkansas, Mississippi, South Carolina, Georgia, Florida, North Carolina and Tennessee. In the first named State for the three years 1910, 1911, 1912, nearly one-third or 32.7 per cent. of all registered deaths in children were ascribed to malaria.

In the Mississippi area for the last two months of 1913, the deaths registered as due to malaria were 2.3 times greater in number amongst the coloured than amongst the white population.

The months of greatest prevalence are August and September, though the number of fresh infections begins to increase in May.

The tertian parasite appears to be most widely distributed, the quartan is very rare and is only responsible for one-eighth of all infections. Three species of anopheles—*A. quadrimaculatus*, *punctipennis* and *crucians* are widely distributed; to the first named the spread of malaria in the Southern States is attributed.

ii. The regions in the State of Alabama in which malaria prevails to the greatest extent are apparently in the Tennessee Valley belt and the central prairie region. The disease is most prevalent during the hot summer months, May to August. The tertian parasite accounts for the majority of all infections. Deaths from malaria were only reported from eight of the sixty-seven counties in the State. The number in children reaches 28 per cent. of the total malaria death rate.

[It is to be regretted that these papers on malaria are of little scientific value, as the same facts are recapitulated in several papers in a slightly different form. (See this *Bulletin*, Vol. 1, p. 488, Vol. 2, p. 7, and Vol. 3, p. 256). The method of investigation by means of enquiry from private physicians appears to be inadequate and tends to the formation of conclusions on data which are obviously incomplete.]

- i. VON EZDORF (R. H.). Investigation of Malaria in the United States by the United States Public Health Service.—*Southern Med. J.* 1914. May 1. Vol. 7. No. 5. pp. 349-350.
- ii. SHOULDERS (H. H.). Malaria as a Public Health Problem.—*Ibid.* pp. 351-353.
- iii. BASS (C. C.). Treatment and Cure of Malaria.—*Ibid.* pp. 353-357.
- iv. BOOTH (B. H.). Malaria during the First Three Months of Life.—*Ibid.* pp. 357-358.
- v. DEADERICK (William H.). Some Factors in the Prevention of Malaria.—*Ibid.* pp. 367-369.
- vi. CARTER (H. R.). Quinine-fast Malarial Parasites: a Memorandum.—*Ibid.* pp. 369-370.

A series of papers of a general nature dealing with various aspects of malaria. No new theories are broached nor are any original observations recorded.

i. Von Ezdorf recapitulates the familiar methods adopted in the prevention of malaria.

ii. This paper consists of an exhortation to the municipal bodies of the Southern States to commence a vigorous anti-malarial campaign.

iii. A well written paper by Bass advocating the rational administration of quinine. No mention is made of the intramuscular method.

iv. Booth appears to favour the "hypodermatic" administration of quinine in the treatment of infants.

v. In this paper Deaderick once more urges the obvious truth that the suppression of malaria assists in the abolition of other water and insect-borne diseases.

vi. Carter elaborates the hypothesis that latent malaria parasites are quinine resistant because (1) the parasites that survive are less susceptible than normal to quinine, and (2) they live in an organ less accessible to the drug than the circulating blood.

P. H. B.

LEGER (André). Le Paludisme dans le Haut-Sénégal et Niger. Index endémique de la Ville de Bamako.—*Bull. Soc. Path. Exot.* 1914. Mar. Vol. 7. No. 3. pp. 181-184.

This paper embodies the results of blood examinations of 1,721 children, of whom 707 were less than three, and the remainder 3-15 years of age, all from Bamako or from the surrounding villages. The results are striking and may be summarised in the following table.

Years 1911 and 1912.	Children of 1 month to 3 years of age.			Children of 3-15 years.			Total per- centage infected.
	No. ex- amined.	No. in- fected.	Per- centage.	No. ex- amined.	No. in- fected.	Per- centage.	
Wet season	385	369	95·85	474	403	85·21	90·53
Dry season	322	236	73·29	540	276	51·11	62·20

There appears to be a veritable malarial epidemic amongst the negroes during the season of the highest atmospheric temperature and greatest humidity. The children under three years are proportionally more heavily infected than those over this age. The quartan parasite is by far the commonest species, forming from 58.88 per cent. during the wet season and 49.53 per cent. during the dry season of the total number of infections with all the species of malarial parasites. The proportional infection with the subtertian parasite remains practically the same at all seasons; the tertian parasite is relatively rare. The following table gives an idea of the relative proportions of the different infections:—

Age of children examined.	Wet season.	Species of parasite.					
	No of children infected.	<i>P. malariae.</i>		<i>P. falciparum.</i>		<i>P. vivax.</i>	
1 month—3 yrs. of age.	369	213	57.72%	150	40.65%	6	1.63%
From 3—15 yrs. of age.	403	242	60.05%	135	33.49%	26	6.46%

These figures sufficiently indicate the intensity of malaria in the capital of Upper Senegal and the Niger, and the danger of these heavily infected villages as a source of infection.

P. H. B.

- i. SERGENT (Edmond). *Sur la Lutte contre le Paludisme.—Propaganda Antimalarica.* 1914. Apr. 30. Vol. 7. No. 2. pp. 25-28.
- ii. ORTA (Francesco). *Osservazioni sulla Malaria di Porto Corsini.—Ibid.* pp. 29-32.
- iii. SAITTA (Salvatore). *La Campagna Antimalarica in Troina nel 1913.—Ibid.* pp. 32-34.
- iv. SERGI (Antonio). *La Profilassi Antimalarica nelle Scuole di Palizzi nel 1913.—Ibid.* p. 34.
- v. ORTA (Francesco). *Bonifiche e Malaria nel Ferrarese.* [Drainage Works and Malaria in the Province of Ferrara.]—*Ibid.* pp. 35-39.
- vi. SERGI (Antonio). *Sulla Dottrina Zanzaro-malarica.* [On the Mosquito Theory of Malaria.]—*Ibid.* pp. 40-44.

i. A paper by the Director of the Pasteur Institute of Algeria, which discusses briefly, but in a very fair and impartial spirit, the general principles upon which a campaign against malaria should be carried on. In Algeria all the protective methods known are made use of, according to the judgment of those on the spot, without preference or prejudice. One excellent measure, however, may be specially noted. It is the practice in Algeria to run off the water periodically from all irrigation channels, so as to dry the bed of the stream thoroughly for a sufficient period to kill all mosquito larvae, wherever practicable;

and with this end in view all such channels, as far as possible, are laid out in duplicate so that the irrigation may not be interfered with.

ii and v are concerned with the local conditions of the province of Ferrara.

iii. The malaria of the year 1913, in Troina in Sicily, was mild in character, which the author attributes in part to the violent rain storm of October 12, 1912, which scoured out thoroughly all the water courses of the district.

iv. A short school report from the commune of Palizzi. No case of malaria occurred amongst 90 school children to whom quinine was administered daily, during the months of June and July, whilst the proportion of infected cases amongst the non-protected part of the population, during the same period, amounted to 4 per cent.

vi. A theoretical discussion of the subject of mosquito infection according to the views of various authorities.

J. B. Nias.

ROWLEY-LAWSON (Mary). **A Stage in the Migration of the Adult Tertian Malarial Parasite. Evidence of the Extracellular Relation of the Parasite to the Red Corpuscle.**—*Jl. Experim. Med.* 1914. May 1. Vol. 19. No. 5. pp. 450-458. With 5 plates.

The scope of this paper may be indicated by a recitation of the author's conclusions.

These are :—

1. What appear to be certain definite stages in the migration of the malarial parasites from red corpuscle to red corpuscle may be demonstrated by thorough and persistent observations.

2. The migration of the malarial parasite from red corpuscle to red corpuscle gives a reasonable explanation of the loss of red corpuscles which cannot be accounted for by the destruction of the infected corpuscles at the time the parasites segment.

3. Migration to other red corpuscles is a satisfactory explanation of the ultimate fate of the young parasites seen in instances of multiple infection of single corpuscles.

4. In the light of the facts here presented, it would seem impossible to explain the instances of the parasites partly on and partly off degenerated red corpuscles as the result of technique. A stage in the migration of the parasite seems to be the probable interpretation.

5. Attachment to the external surface of the corpuscles seems to be the only possible explanation of the appearances of the parasites in the figures accompanying the paper.

[The paper is illustrated by one coloured and four photographic plates, comprising altogether some 78 figures, which, it must be confessed, cannot be regarded as convincing proof of the author's contentions. It is doubtful if her views will gain general acceptance.]

P. H. B.

THOMSON (David). **The Origin and Development of Gametes (Crescents) in Malignant Tertian Malaria: Some Observations on Flagellation, etc.** (Being Part II of the Report on the Malarial Expedition to Panama, 1912).—*Ann. Trop. Med. & Parasit.* 1914. Apr. 21. Vol. 8. No. 1. pp. 85-104. With 1 coloured plate.

A report of work undertaken partly in conjunction with

Dr. W. M. JAMES at the Ancon Hospital, Panama, and partly in the Royal Southern Hospital, Liverpool. The conclusions reached were as follows:

1. Crescents are produced from ordinary asexual spores of *P. falciparum*, and are the outcome of a development of immunity towards the latter.
2. They develop in some internal organ, afterwards appearing suddenly in the blood, requiring a period of about ten days for their development. They do not live for more than a few days in the peripheral blood, but their presence there for a longer period is due to the replenishment of their numbers from surviving asexual forms.
3. Quinine has no direct destructive action on crescents, either during or subsequent to their development, but it destroys the asexual source of supply.
4. In 20-grain daily doses it reduces their numbers to less than one per cmm. of blood within three weeks.
5. In the inner organs crescents develop chiefly in the bone-marrow and spleen.
6. The chromatin of the crescents stains fainter and is less abundant and more finely granular than that of the schizonts. The pigment in the developing crescents appears early, even in the youngest forms, and it remains scattered until the adult stage is reached, whereas in the schizont the pigment in all stages is more or less concentrated into one mass. The shape of the developing microgametocyte is often spherical. No evidence has been obtained of parthenogenesis in crescents.
7. Crescents subjected to thorough and continuous quinine treatment are yet able to exflagellate.
8. The spherulation of crescents is probably due to osmosis, which in turn probably stimulates the actual flagellation. The polar bodies are probably extruded chromatin; there is no reason for believing that crescents ever flagellate in the circulating blood.

P. H. B.

HENSON (Graham E.). *Man, the Principal Etiologic Factor in the Perpetuation of Malaria, with Special Reference to the Endemicity of the Disease in the Temperate Zone.*—*Jl. Amer. Med. Assoc.* 1914. May 2. Vol. 62. No. 18. pp. 1374-1377.

A general paper dealing with (a) the detection of gamete carriers; (b) the formation of gametes in the circulation of man; (c) the transfer of these forms from one host to the other and the evolution of the parasites in man and the mosquito; and (d) the significance of early diagnosis and the rational treatment of all malarial infections.

P. H. B.

BASS (Murray H.). *Congenital Malaria.*—*Archives of Pediatrics.* 1914. Apr. Vol. 31. No. 4. pp. 251-258.

The author records a case of malaria of supposed congenital origin in an infant. The blood of an intensely anaemic baby (seven and a half weeks old) was examined microscopically and a large number of tertian parasites were found. The haemoglobin percentage is stated to have been between ten to fifteen per cent. From subsequent enquiries it was found that the mother had suffered from fever while five months pregnant, so that the infection in this case appeared to have taken place by penetration of the plasmodia through the placenta. Under quinine rapid improvement took place.

P. H. B.

FUCHS-WOLFRING (Sophie). **Réveil du Paludisme à la Suite d'une Cure de Tuberculine.**—*Rev. de la Tuberculose*. 1913. Dec. 2 ser. Vol. 10. No. 6. pp. 407-411. With 1 plate and 1 fig.

An account of a relapse of malaria in Davos following on subcutaneous injection of tuberculin and occurring three years after the patient had left the endemic area (Turkestan) and apparently after a quiescent period of twelve years.

A very beautiful plate, depicting the quartan parasite, accompanies the article.

P. H. B.

RODENWALDT. **Immunität gegen Malaria bei Negeren.** [Immunity from Malaria in Negroes.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Apr. Vol. 18. No. 7. pp. 254-263.

Rodenwaldt disagrees with v. d. HELLEN's statements (see this *Bulletin*, Vol 2, p. 316) that the negro soon loses his relative immunity to malaria and that only the negro children are affected. This is opposed to his experience in Togo, where every adult negro suffers from malaria, though the clinical symptoms may be very slight.

P. H. B.

MATHIS (C.). **Epidémie de Paludisme ayant sévi dans la Province de Sontay durante l'Eté de 1913.**—*Bull. Soc. Path. Exot.* 1914. May. Vol. 7. No. 5. pp. 388-391.

The author of this paper was deputed to investigate a febrile epidemic in certain villages of French Cochinchina. Of 245 cases examined 21.2 per cent. were found to harbour malarial parasites. All three species of *Plasmodium* were represented.

Anopheles, such as *Myzorrhynchus sinensis*, *pseudopictus*, *barbirostris*, *fuliginosus*, and *Myzomyia rossii* were present in considerable numbers (see also this *Bulletin*, Vol. 3, p. 433).

P. H. B.

SCHÜFFNER (W.) & SWELLENGREBEL (N. H.). **De Anophelinen in Deli in verband met de Uitbreiding der Malaria.** [The Anophelines in Deli in connection with the Spread of Malaria.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1914. Vol. 54. Pt. 2. pp. 140-162. With 3 plates.

There has been a great increase in the amount of malaria met with on the eastern coast of Sumatra during the last few years, which the authors are inclined to attribute to an alteration in the distribution of mosquitoes.

Taking the sickness returns of the amount of malaria amongst the very large number of coolies, approximately 7,000 at the present time, employed on the tobacco plantation known as the Senembah Mij at Deli, they show that there has been an increase in the number of malarial cases annually, from an average of 17 per mille in the year 1906 and previously, to 79 per mille for the first half of 1913. The greatest increase was in the pernicious form, the next greatest being in benign tertian, while the amount of quartan remained practically

unaltered. After going through all the possible causes of this increase, the authors come to the conclusion that it is in some way connected with an increased prevalence of anopheline mosquitoes, and as a preliminary to the further investigation of the question they give a list of the species which have been found up to the present on the east coast of Sumatra. These are as follows:—

1. *Cellia kochi* (Dönitz 1901). Pathological importance uncertain.
2. *Myzomyia rossii* (Giles 1892). Probably not a carrier.
3. *Myzomyia vaga* (Dönitz 1902). A carrier at least of malignant malaria.
4. *Myzomyia leukosphyra* (Donitz 1901). Pathological importance uncertain.
5. *Myzomyia punctulata* (Dönitz 1901). Pathological importance uncertain.
6. *Myzomyia albirostris* (Theobald 1903). Carries all forms of malaria.
7. *Myzorrhynchus sinensis* (Wiedeman 1828). Probably not a carrier.
8. *Myzorrhynchus barbirostris* (v. d. Wulp 1884). Carries all forms of malaria.
9. *Myzorrhynchus albotaeniatus* (Theobald 1903). Pathological importance uncertain.

Three plates showing anatomical details of the above named species are appended.

J. B. N.

CHIMISSO (Luigi). Contributo alle Manifestazioni Cutanee della Malaria con Particolare Riguardo a una Forma di Ectima. [Contribution to the Cutaneous Manifestations of Malaria with Special Reference to a Form of Eczema.]—*Riforma Medica*. 1914. Mar. 28. Vol. 30. No. 13. pp. 345-348; and Apr. 4. No. 14. pp. 373-380.

The author gives a list of several skin lesions which are sometimes found in cases suffering from chronic malaria. Amongst these are mentioned papules, vesicles, boils, ulcers, herpes, urticaria, etc. He describes a form of eczema, amenable to quinine, which he believes is more or less characteristic of the disease.

P. H. B.

EMIN (Ahmed). Une Variété nouvelle du Parasite de Laveran.—*Bull. Soc. Path. Exot.* 1914. May. Vol. 7. No. 5. pp. 385-387. With 1 plate.

The author believes he has discovered a new malarial parasite in the blood of pilgrims at Camaran, an island in the Red Sea, some 30 miles from Hodeidah.

In the younger stages the parasites resemble the benign tertian plasmodia, but fewer merozoites are formed and the gametocytes do not enlarge the host cell. It is not certain whether true Schüffner's dots are formed or not.

LAVERAN, in acknowledging this communication, stated as his belief that there are gradations between all the well-known types of malaria parasites, a fact to his mind in favour of the unity of all the species at present recorded.

P. H. B.

BUTTERFIELD (E. E.) & BENEDICT (L. S.). **On the Alleged Rôle of Hematin in the Production of the Malarial Paroxysm.**—*Proc. Soc. Experim. Biol. & Med.* 1914. Vol. 11. No. 3. pp. 80-82. With a curve.

In this paper a number of experiments are recorded on the effect of intravenous injections of haematin in causing a rise of temperature. The haematin was dissolved in .9 per cent. salt solution containing 1.5 per cent. NaHCO_3 . After intravenous injection of this solution in rabbits there was no resemblance in either temperature curve or other respects to the malarial paroxysm in man.

In addition to the experimental work on rabbits, the blood sera of 19 patients with malarial organisms in the blood were examined for haematin. In no case was haematin demonstrable.

P. H. B.

MALISCH. **Oeffentliches Sanitätswesen. Die Malaria im Südösten Deutschlands.** [Malaria in South-East Germany.]—*Deut. Med. Wochenschr.* 1914. Apr. 9. Vol. 40. No. 15. pp. 763-764.

Malaria has almost died out in Germany; only four cases were microscopically diagnosed in the Hygienic Institute at Beuthen (East Germany) in 1912, but in Pless in 1913 Malisch verified its existence in 100 cases.

P. H. B.

BRADDOCK (Charles S.). **Tropical Malaria and its Causes.**—*New York Med. Jl.* 1914. May 16. Vol. 99. No. 20. pp. 976-979.

Braddock, who has been a lieutenant in the U.S. Navy and has also travelled extensively in Siam, French Indo-China, the Federated Malay States, Ceylon and Egypt, believes that the mosquito is not the only carrier of malaria, but that the infection exists in water and in soil, whence the mosquito itself contracts the germs and transmits them to man. In some such manner as this the existence of epidemics in districts uninhabited by man may be explained.

[It is interesting to note that, even though the mosquito-malaria theory has received abundant confirmation, sceptics still flourish. Such a one is Dr. Braddock; but if he wishes to assail a well grounded theory in such a dogmatic manner, he would find it advisable to make certain of his facts. His statement, for example, with reference to the absence of anophelines in Mauritius is incorrect. A brief reference to Sir R. Ross's book, "The Prevention of Malaria," pp. 634 and 635, would have convinced him of this. *Pyrethophorus costalis* has been incriminated, as a malarial carrier, by Ross, STEPHENS, CHRISTOPHERS, ANNETT and AUSTEN and is undoubtedly the chief carrier in that island.]

P. H. B.

PROPHYLAXIS.

FISCH (R.). *Die Wirkung der Malariaphylaxe bei den Missionsangestellten in Kamerun.* [Malaria Prophylaxis in the Kamerun Missionary Stations.]—*Beihefte z. Arch. f. Schiffs- u. Tropen.-Hyg.* 1914. Apr. Vol. 18. Beiheft 4. pp. 5-39. [pp. 121-155]. With 18 figs.

This paper embodies a summary of replies to a series of detailed questions addressed to members of the Basel Mission in Kamerun. By these means it was hoped to gain some idea of the efficacy of the various forms of malaria prophylaxis both medicinal and mechanical, though the author thinks the latter method can hardly be seriously considered at the present moment.

The quinine prophylaxis of Koch (1 gramme every 6th or 7th day), as well as that advocated by Plehn (·5 gramme every 5 days), have both been abandoned and in their place systematic dosage of ·8 to 1 gramme of quinine hydrochloride every fourth day has been substituted. The author believes that prophylactic quinine in too small and too frequent dosage is not to be encouraged as being apt to favour the development of quinine resisting gametes. 459 returns were sent in, concerning 91 men, 73 women, 132 children (75 boys and 57 girls). Save for the matter of quinine prophylaxis the conditions under which the Missionaries labour are the same to-day as thirty years ago, therefore the author considers a contrast between the mortality returns at different periods can reasonably be instituted. The pre-prophylactic period lasted from 1886-1897, and the prophylactic from 1897-1913.

For statistical purposes the numbers are divided into three groups: (a) the non-prophylactics, 57 men and 31 women, 88 persons; (b) prophylactics taking less than ·8 gramme quinine twice a week, 17 men and 29 women, 46 persons; (c) prophylactics taking more than ·8 gramme quinine twice a week, 36 men and 19 women, 55 persons.

The 88 persons in the first group served an average period of two to four years without a return to Europe, and those of the second and third groups 3 to 5 and 4 years respectively, but these figures are by no means so impressive as the following. Of the non-prophylactics only 59 per cent. returned to Kamerun, while of the prophylactics of the first class 87 per cent., and of the second no less than 100 per cent.

Accurate statistics of the morbidity and mortality from malaria and blackwater fever have been kept for the last twenty-eight years. From them it appears that from 7·4 per cent. of the non-prophylactics died from these diseases, while of the prophylactics of the first and second classes no single death from malaria is recorded, though 59 per cent. of the former and 41·7 per cent. of the latter suffered from attacks of malaria from time to time. The last death from malaria occurred in one who in deference to religious scruples, refused to take quinine. He died after being nine months in the country.

Blackwater fever appears to have been a frequent complication in the pre-prophylactic period, 49 cases with 16 deaths having been recorded, but in recent years amongst the prophylactic there appears to have been but 13 cases with one death. Four cases of blackwater with one death are recorded from a series of 40 non-prophylactic children; and only one, who eventually recovered, from a series of 64

prophylactics of a similar age. If the gross mortality from all causes be divided into quinquennial periods the following telling figures emerge.

Period	Number of Missionaries.	Death rate per cent.
1886-1892	35	25.7*
1892-1897	59	10
1897-1902	87	3.4
1902-1907	125	4
1907-1913	164	1.2

Had conditions in the last quinquennial period been similar to those prevailing in the earlier days of the history of the Mission, no less than 39 deaths would have been a reasonable estimate instead of the two deaths which actually did occur.

P. H. B.

DIAGNOSIS.

BOSCO (P.). *Sul Valore Pratico dei Thick Films per la Diagnosi microscopica della Malaria.* [The Practical Value of Thick Films in the Microscopic Diagnosis of Malaria.]—*Polichinico. Sez. Medica.* 1914. May 1. Vol. 21. No. 5. pp. 238-244.

The author gives his experience of the thick film method recommended by W. M. JAMES in the *Southern Medical Journal* for December 1910 for the rapid detection of the parasites of malaria, and is of opinion that it is not more certain in its results than the ordinary thin film process, but decidedly more expeditious. Comparative tests were made on patients under treatment with quinine, and the final disappearance of parasites from the blood was ascertained as readily by the ordinary process as by the thick film method, if sufficient time were given to the examination. A few trifling modifications of the technique are described, such as placing the slide in a weak solution of bicarbonate of soda in order to neutralise the acid of the acid alcohol, instead of continued washing in running water. The author gained his practical experience of the value of the method with the army in Libya. Too long an immersion of the films in the acid alcohol used for fixing, say for more than 12 hours, will dissolve the pigment of the parasites, especially of the crescentic forms, a fact of which use may be made when it is desired to bring out the chromatin of the parasites more clearly.

J. B. N.

FRASSETTO (Augusto). *Sulla Presenza di Autolisine Endo ed Extraglobulari nel Sangue dei Malarici.* [On the Presence of Endo- and Extraglobular Autolysins in the Blood of Malaria Patients.]—*Malaria e Malat. d. Paesi Caldi.* 1914. Mar.-Apr. Vol. 5. No. 2. pp. 79-84.

Investigating this question by De BLASI's methods, the author was unable to find any trace of autolysins in the serum of 15 cases of malarial infection, either with the undiluted serum or in a dilution of

*Four deaths from Malaria, 5 from Blackwater.

1:5, but in one case of chronic malarial cachexia a feeble autolytic reaction was obtained. The sera were tested both at room temperature, and after heating to 55°, 60°, 65°, and 70° Cent. for 30 minutes. On the other hand, the aqueous extract of malarial blood, in contradistinction to that of non-malarial, will exhibit a constant autolytic reaction which, however, is variable in amount, and is most marked in chronic relapsing cases. The results are shown in tabular form at the end of the paper.

[See also a paper by ZOIA on the same subject, this *Bulletin* Vol. 2, p. 560.]

J. B. N.

TREATMENT.

- i. TRESIDDER (A. G.). A Case of Malarial Coma lasting 46 Hours; Recovery.—*Lancet*. 1914. Mar. 28. pp. 891-892. With 1 chart.
- ii. ROSS (Ronald). Intramuscular Injections of Quinine. [Correspondence].—*Ibid*. Apr. 4. pp. 1003-1004.

i. A soldier, who had been taking quinine for some time previously, became suddenly unconscious; the dilated pupils, absence of ocular paralysis, normal fundi oculorum, spasticity of the legs, incontinence of urine, and high temperature (102° F.), in spite of a negative blood examination, combined to make malarial coma the most probable diagnosis. This was confirmed by the rapid return to consciousness after repeated intramuscular injection of quinine hydrochloride. Epileptiform convulsions rendering his condition critical were treated by rectal salines; at this stage the urine contained one-tenth albumin, though a week after the comatose attack the urine became normal. A transitory delusional insanity delayed convalescence. The author considers that as the underlying pathology of this condition is due to a blocking of the cerebral vessels, it is essential to destroy the parasites as well as to push them out of the cerebral capillaries; he suggests that treatment should be commenced with an intravenous injection of 5-10 grains of quinine hydrochloride.

ii. Writing in reference to the above case Sir Ronald Ross points out that experiments carried out for several years past have shown that quinine is absorbed with very great difficulty from the muscular and subcutaneous tissues. The dose given by intramuscular injection generally remains *in situ* and, if the case is a dangerous one, the parasites are allowed to multiply unchecked in the patient's blood. He thinks that the profession should be warned against using these injections except in some rare cases.

P. H. B.

PEIPER (Otto). Ueber Malariabehandlung mit Hydrochinin. Ueber Papatacelfieber. [The Treatment of Malaria with Hydroquinine.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Apr. Vol. 18. No. 7. pp. 221-232.

After an extended trial of hydroquinine on 19 tertian and subtertian infections (no cases of a quartan infection were discovered), Peiper concludes that hydroquinine is a very efficient drug in malaria, equally

as efficient as the alkaloid in subtertian infections and more especially in the benign tertian. Subcutaneous and intramuscular injections of the drug are not to be recommended.

P. H. B.

CLARENC (H.). *Les Méthodes d'Administration de la Quinine.*—*Bull. Soc. Méd. de l'Île Maurice*. 1913. Oct.-Nov.-Dec. Vol. 31. 2^{me} Serie. No. 34. pp. 51-63.

This paper contains a few original observations on the methods of administering quinine in therapeutic doses. The author has had good results with a combination of quinine and a decoction of *Azadirachta indica* (Neem or Margosa Bark) a plant which possesses a high percentage of tannin and has acquired a reputation as a febrifuge in India. Clarenc prepares an extract from the leaves which he combines with quinine in pill form.

P. H. B.

BAERMANN (G.). *Zur Wirkung des Hydrochinin und seiner höheren Homologen (Aethylhydrokuprein u. a.) bei Malaria.* [The Action of Hydroquinine and its Higher Homologues in Malaria.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. May. Vol. 18. No. 9. pp. 293-306.

As our knowledge of malaria grows more extensive, it is becoming apparent that certain local varieties of the disease are completely resistant to the action of quinine. In view of this experience many workers have striven to discover a derivative of quinine with higher parasitotropic properties than the pure alkaloidal base, which would be capable of destroying the more resistant gamete forms.

Baermann's observations on hydroquinine were made on the east coast of Sumatra where the epidemic malaria appears to be of a particularly mild type. 78 cases were treated in all, and the blood was examined in some instances twice daily. 1 gramme of hydroquinine was injected intravenously in twelve cases repeated on four occasions. In a third of this number this dose was sufficient effectually to clear the blood of parasites and to prevent any further relapses.

To six cases hydroquinine, in doses of from .4 to .6 gramme, was administered by the intramuscular route and of these four remained free from further relapses.

Ethylhydrocuprein in doses of .5 gramme injected intramuscularly was found to be particularly effective, though the local reaction after its use is more intense and gives rise to a certain amount of inconvenience; intravenous injections were not followed by nearly such good results. In two cases only doses of .5 to .75 gramme sufficed to sterilize the blood; per os the drug (2 grammes four times daily) proved to be unsuitable. Isopropylhydrocuprein hydrochloride (.2 gramme three to four times daily for 5-8 days) exhibited antimalarial properties of a high order. On the other hand Isoamylhydrocuprein has only a feeble action and Isopropylhydrocuprein and Isoamylhydrocuprein bases appear to have no action at all. [See also this *Bulletin*, Vol. 3, p. 147, p. 257, and p. 435.]

P. H. B.

MUEHLENS (P.). **Behandlung akut bedrohlicher Zustände bei Tropenkrankheiten.** [The Treatment of Acute Symptoms in Tropical Diseases.]—*Deut. Med. Wochenschr.* 1914. Apr. 9. Vol. 40. No. 15. pp. 737-740.

Acute symptoms are met with in all three varieties of malaria. Their causes may be stated as follows:—(1) Heavy blood infection or exalted virulence of the parasites. (2) Individual disposition of the patient. (3) Complications of other disease conditions. (4) Rupture of the spleen. (5) Blackwater fever.

Muehlens thinks that in all serious cases, especially in malignant infections, it is advisable to apply a combined quinine and salvarsan treatment. The quinine may be given by the intramuscular, the salvarsan by the intravenous route, or *vice versa*. He recommends a new preparation of salvarsan called Arsalyt (dose .1 gramme to every 10 kilogrammes body weight); a 4 per. cent solution is injected directly into a vein with a 20 cc. syringe.

P. H. B.

POPE (Curran). **Chronic Malaria Cachexia and its Relation to Neurasthenoid Conditions.**—*Boston Med. & Surg. Jl.* 1914. Feb. 5. Vol. 170. No. 6. pp. 193-197.

A clinical lecture which concerns itself largely with the treatment of malarial cachexia and the differential diagnosis of the condition from neurasthenia.

The author believes hospital or sanatorium treatment to be absolutely essential for the complete relief of these patients and their return to normal activity.

During treatment acute malarial attacks have occurred. The author is positive that these attacks are brought about by forcible concussion of the twelfth dorsal, first, second and third lumbar vertebrae by a very powerful jet douche which he considers produces contraction of the spleen with subsequent liberation of malarial organisms and a resulting attack of malaria. In several cases he has noticed that such an attack occurs after a mechanical concussion of these vertebrae.

He believes that these cases are best treated by massage, manual and mechanical, and by electro- and hydrotherapy. Bedridden cases are warm-sponged and subsequently rubbed with a rough towel; ambulatory cases are treated with hot pack and subsequently with application of cold water; and, for medicinal treatment, he believes iron and arsenic to be superior to quinine.

[The lowering of the vital resistance by the application of cold water to the spine seems to the reviewer a much more acceptable explanation of these malarial relapses than the more original one advanced by the author.]

P. H. B.

SCHWYZER (Fritz). **Erfahrungen über chronische Malaria.** [Experiences in Chronic Malaria.]—*Correspondenz-Blatt. f. Schweizer Aerzte.* 1914. Mar. 7. Vol. 44. No. 10. pp. 294-305.

A clinical lecture on malaria containing no new or original observations. The author is no believer in quinine prophylaxis. He

thinks that Warburg's tincture (a 2 per cent. alcoholic solution of quinine with the addition of cubebs, camphor, and rhubarb) is only of value in cases of malarial neurotics.

P. H. B.

ANIMAL MALARIA.

SEIDELIN (Harald) & CONNALL (Andrew). A Note upon the Occurrence of a *Plasmodium* in the Blood of West African Monkeys.—*Ann. Trop. Med. & Parasit.* 1914. Apr. 21. Vol. 8. No. 1. pp. 81-82.

Pigment-containing parasites were found in three young monkeys, *Papio sphinx* and *Cercopithecus mona*, at Yaba near Lagos.

The parasites—mostly gametocyte forms—were extremely scarce and differed in various respects, such as the yellow colour of the pigment and faintness of the stained chromatin, from human malarial parasites.

The authors believe that the chief interest in this communication is the occurrence of this infection in young monkeys and not in old ones, and it is possible that infection in these animals may conform to the same rule as applies to human malaria, and that with increasing age a natural immunity is developed. [See also paper by LEGER and BOUILLIEZ, this *Bulletin*, Vol. 3, p. 159.]

P. H. B.

ERRATUM.

Vol. 3, No. 8, p. 432, last line: In the sentence "Professor Stephens proposes to call the new parasite *Plasmodium pertenu*," the name *Plasmodium pertenu* should read *Plasmodium tenue*.

G. C. L.

BLACKWATER FEVER.

GRIENWANK (E.). Quelques Considerations étiologiques et thérapeutiques sur la Fièvre bilieuse hémoglobinurique.—*Gaz. Hebd. des Sci. Méd. de Bordeaux*. 1913. Sept. 7. Vol. 34. No. 36. pp. 421-423.

In French West Africa blackwater fever makes its appearance directly the cold winds of autumn are felt, that is about the end of September.

In treatment Grienkank employs serum in the proportion of 15 to 100 parts of a solution containing 15 grammes of sodium chloride to a litre of water, which must be injected subcutaneously as soon as possible in quantities of 250-300 cc. Serum saline is preferred to plain saline as being less irritating to the kidneys. The same quantity is injected every eight hours till the urine becomes clear.

In cases with a tendency to suppression he gives the injections as before and applies blisters to the lumbar region. He condemns the practice of giving chloroform water to allay the vomiting.

Quinine is contra-indicated till after the attack. As a demulcent he advises the following concoction :—

Lactose, grammes 40.

Sodium chloride, grammes 15.

Tincture of Kinké liba (an African plant well-known for its diuretic properties), 1,000 grammes.

P. H. Bahr.

VINSON (L.). Contribution à l'Etude de la Malaria.—*Bull. Soc. Méd. d'Ile Maurice*. 1913. July-Aug.-Sept. Vol. 31. 2me Série No. 33. pp. 37-44.

This paper records a case of blackwater fever with cerebral complications in a man of 45 years of age, the subject of a subtertian infection. The author thinks that quinine given by the intravenous route can have no influence on the production of haemoglobinuria, for in this case recovery rapidly ensued after the intravenous injection of one gramme of quinoform. A further point of interest was that several members of the patient's family exhibited a tendency to haemoglobinuria.

P. H. B.

HELMINTHIASIS.

DISTOMIASIS.

SSIMINTZIN (D.). **Neue Tatsachen über die Biologie der *Fasciola hepatica* L. Vorläufige Mitteilung.** [New Researches on the Biology of *Fasciola hepatica*.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1914. June. 13. Vol. 74. No. 3/4. pp. 280-285. With 3 figs.

Experimenting with the cercariae of *Fasciola hepatica* after they escape from the mollusc *Limnea truncatula* the author finds that they may become encysted in the water instead of on grass as they are generally supposed to do. He has found that 66 per cent. encyst about $\frac{1}{2}$ cm. below the surface of the water, 24 per cent. deeper and 10 per cent. higher, of which latter 6 per cent. are encysted in cysts which actually remain on the surface of the water. It results therefore that animals and man can readily be infected through drinking this water.

This method of infection was studied in rabbits. The young flukes escape from the cysts in the intestine and then make their way into the peritoneal cavity where they can be found from the fourth to the fourteenth day. They then invade the liver as well as other organs and enter these by actually forcing their way through the peritoneal surface of the organs.

C. M. Wenyon.

NAKAGAWA (K.) **Experiments on the Development and Resisting Power of the Ova and Embryo of *Distoma pulmonalis*.** [In Japanese]—*Jl. of the Med. Soc. of Tokyo.* 1914. Jan. Vol. 28. No. 2.

The author artificially hatched the ova of *Distoma pulmonalis* [*Paragonimus westermani*], taken from the sputum of a patient who was suffering from distomiasis of the lungs. He traced their development and made a few animal experiments. He concludes that:—

1. The ova of *Distoma pulmonalis* are generally swollen according to their development.
2. The life of the embryo which has escaped into water is very short.
3. The most suitable temperature for the development of the ova seems to be 25°-31° C., and the embryo emerges after 23-27 days.
4. Sunshine prevents hatching; a dark place is most suitable for development.
5. Oxygen is necessary for hatching.
6. The ovum dies if it is dried.
7. The full grown ova and embryos are very easily killed by the acid of the stomach.
8. In the animal experiments the embryo never entered the body by the mouth or skin.

M. Kumagawa.

PONS (J. A.). *Paragonomiasis*.—*Revista Med. de S. Paulo*. 1914. Mar. 31. Vol. 17. No. 6. pp. 92-94.

A well-written account of this disease for the information of Brazilian readers. It contains, however, nothing that will not be found in the latest editions of English text-books on tropical medicine. The author does not quote any cases.

J. B. Nias.

SCHISTOSOMIASIS.

CONOR (A.). *Essais de Transmission de la Bilharziose*.—*Bull. Soc. Path. Exot.* 1914. Mar. Vol. 7. No. 3. pp. 202-206.

The author has attempted to obtain support for the theory of Looss that the miracidia of *Schistosoma haematobium* bring about infection of man by penetrating the skin. Miracidia free from urine were obtained by centrifuging the urine and washing the eggs in water. The experimental animals were carefully examined post mortem, special attention being paid to the bladder, intestine, liver, portal vein and the area of skin on which the experiment was made.

One monkey was inoculated subcutaneously six times but showed no sign of infection. Another monkey received seven similar injections with no result. A monkey was inoculated in the thigh and died four days later. At the site of inoculation there were found three empty egg-shells and one egg containing a motionless embryo. A fourth monkey received three injections with no result. Similar fruitless experiments were made on eight sheep, two rabbits, three guinea-pigs and a rat.

In another series of experiments the liquid containing the living miracidia was simply deposited on the skin. Four supplies of this fluid were placed on the skin of a sick monkey at half-hour intervals. The animal died next day and the skin at the site of experiment was carefully removed. The under surface was scraped and in the scrapings were found four embryos which were easily recognised. Another monkey similarly treated gave a negative result.

Two rabbits inoculated intrahepatically gave negative results.

Two monkeys were immersed in water at 30° C. for eight successive days for half an hour on each occasion. To the water, a quarter of an hour before each immersion, was added urine containing eggs. The experiment gave a negative result.

In all these experiments only one was successful. The author intends to repeat and continue the experiments when opportunity arises.

C. M. W.

HOOTON (A.). *A Case of Bilharzia Disease*. *Indian Med. Gaz.* 1914. May. Vol. 49. No. 5. p. 188.

The case recorded is of a Parsee girl aged 5 years in Rajkot, India, who suffered from haematuria for ten days. Examination of the urine showed a few terminal spined eggs of Bilharzia. After treatment with calcium chloride the haematuria ceased.

C. M. W.

BALFOUR (Andrew). **Febrile Intestinal Schistosomiasis and its Occasional Resemblance to Febrile Appendicitis.**—*Brit. Med. Jl.* 1914. Apr. 25. p. 915.

Writing from Caracas, Venezuela, Balfour says that Dr. Gonzalez-RINCONES has informed him that only intestinal schistosomiasis is known in Venezuela and in connection with it there is often a febrile condition similar to that described by ARCHIBALD in the Sudan (see this *Bulletin* Vol. 3, p. 289). In some cases it has led to a faulty diagnosis of appendicitis.

C. M. W.

CHASTANG. **Comptes Rendus de Parasitologie.** [*Schistosomum japonicum* et Fièvre du Yang-Tse.]—*Arch. de Méd. et Pharm. Navales.* 1914. May. Vol. 101. No. 5. pp. 321-323.

The author points out that the enlargement of the liver and spleen associated with *Schistosoma japonicum* infection, is often accompanied by a type of fever fairly common in the Yangtse Valley. There is fever in the evening up to 40° C. with a fall to about normal in the morning. This may recur for three days, seven days or even longer and is accompanied by gastro-intestinal disturbance and sometimes by a transient urticarial eruption. The attack is followed by great depression. The blood examination shows no malarial parasites but a marked eosinophilia. The eggs of the *Schistosoma* are common in the faeces.

The disease is especially common amongst those who work on or near water as is to be expected from the mode of infection. This explains the fact of the disease being commoner amongst men. The author mentions that HUTCHESON has noted that the treatment of cases of dysentery with emetine, when both amoebae and eggs of *Schistosoma* are present, has given very good results. He was accordingly led to try this drug in cases in which eggs alone were present. The results were very promising.

C. M. W.

TAENIASIS.

ROSSI (A.). **Sulla Patogenesi dell'Anemia da Tenia nana (Ricerche cliniche e sperimentali).** [On the Pathogeny of *Taenia nanum* Anaemia.]—*Il Morgagni. Archiv.* 1914. Mar. Vol. 56. (Part 1). No. 3. pp. 99-108.

The author tested the serum from a case of *Taenia nanum* infection on the red corpuscles of the infected individual, of healthy individuals, and of rabbits, with the result that he found that the toxin elaborated by the worm increases the haemolytic power of the blood and so brings about an excessive destruction of red cells. The anaemia thus produced is increased by the loss of blood constantly going on by way of the intestine. The blood-producing organs are in great part able to compensate for this loss, but in cases of long infection when a number of worms are present this may not be sufficient to prevent severe anaemia.

C. M. W.

BLANCHARD (R.), LEROUX (Ch.) & LABBÉ (R.). *Encore un Cas de Dipylidium Caninum à Paris.*—*Arch. de Parasit.* 1914. Mar. Vol. 16. No. 3. pp. 438-447; and *Bull. Acad. Méd. Paris.* 1913. Séance du 9 Dec. 3 ser. Vol. 70. No. 3. pp. 438-447.

In this paper the authors have collected data referring to *Dipylidium caninum* infections in man. In all 76 authentic cases have been reported from various parts of Europe, United States, Venezuela and South Africa. The authors point out that as the worm is a natural parasite of the dog and cat, with the flea as intermediary host, infection of man probably takes place through these arthropods falling into drinking water, milk and food.

C. M. W.

VINCENZO (Rosei). *Di un Caso rarissimo di Infestazione umana di Dipylidium caninum (Lin.).* [A Rare Case of *Dipylidium caninum* Infection in a Human Being.]—*Policlinico.* Sez. pratica. 1914. Mar. 29. Vol. 21. No. 13. pp. 456-460.

A report of a case of *Dipylidium* infection in a child aged 4 years from Offida (Ascoli) in Italy. During a period of seven or eight months the child constantly passed segments of the worm without being in any way upset by the infection.

C. M. W.

STUART (E. Gertrude). *Hydatid of the Omentum.* [Correspondence.]—*Brit. Med. Jl.* 1914. Mar. 7. p. 531.

Two cases of hydatid of the omentum are described from Quetta, India. The first, a Brahmin woman, aged 30, had had increasing swelling of the abdomen for two or three years. When the abdomen was opened it was found to be occupied by cystic swellings of all sizes up to a foetal head. Forty-two of these were removed, while others had to be left owing to the bad condition of the patient under the anaesthetic. Three weeks later there was another operation and later some of the other cysts which had enlarged were tapped. The woman left before cure was complete. In the second case there were multiple cysts in the abdomen, but many had broken down, while others were filled with pus and matted together. The patient died 24 hours after operation.

Mention is made of two cases of hydatid of the orbit in Pathans for which excision of the eye was undertaken.

C. M. W.

CASAUX (J.). *Deux Observations de Kyste hydatique du Foie chez des Annamites.*—*Bull. Soc. Méd.-Chirurg. de l'Indochine.* 1914. Apr. Vol. 5. No. 4. pp. 136-141.

A record of two cases of hydatid of the liver in natives of Annam. These are the first cases to be reported from Indo-China in natives, though, from their habits and mode of life, one would expect them to be more frequently infected than Europeans, several cases amongst whom have been reported from the colony.

C. M. W.

ANKYLOSTOMIASIS.

- i. DUNBAR-BRUNTON (James). **An Unusual Case of Ankylostoma Infection.**—*Brit. Med. Jl.* 1914. May 2. p. 965.
- ii. LOOSS (A.). **A Mistaken Case of Ankylostoma Infection.** [Correspondence.]—*Brit. Med. Jl.* 1914. June 13. pp. 1327-1328.

i. An Englishwoman complained of intense itching on various parts of the body. This came on usually in the afternoon and passed off in a few hours. There were anaemia, want of appetite and severe epigastric pain. The itching was so intense that it could only be relieved by scratching, which was continued till small needle-like objects were removed from the skin. On examination these were found to resemble embryos of *Ankylostoma duodenale*. Subsequently these appeared in enormous numbers in the mouth, throat, cheek and windpipe, where they caused much coughing and retching. They also seemed to pass out of the tongue. Treatment by thymol, followed by sulphur tabloids for several days brought about a rapid cure. The author can advance no theory to explain this extensive migration of embryos outwards.

ii. Looss, commenting on this case, points out that apart from the fact that the embryos of the *Ankylostoma* are too small to be detected with the naked eye under the conditions described, the whole life-history of the helminth is against the view that the objects removed from the skin were such as they were supposed to be. It is also pointed out that the fact that the individual was a European renders the *Ankylostomic* view very improbable. What the objects were Looss cannot conceive but he is quite convinced that the size alone makes it impossible that they were *Ankylostome* embryos.

C. M. W.

BLIN (G.). **L'Uncinariose chez les Chercheurs d'Or et les Forçats du Maroni.**—*Ann. d'Hyg. et Méd. Colon.* 1914. Jan.-Feb.-Mar. Vol. 17. No. 1. pp. 149-176.

This paper is a lengthy report on the distribution of *Ankylostomiasis* amongst the inhabitants of Maroni in French Guiana. Amongst the convicts the disease is very widespread, for of 732 admitted to hospital during the year 1912, 533 were recognised clinically as suffering from the disease. The condition of affairs is even worse amongst the free living and independent population of the Upper Marmi, where the people live in very primitive fashion and quite without the restrictions of the convicts. The sanitary arrangements are so bad that individuals must constantly be re-infecting themselves with larvae which escape from the eggs that they themselves have deposited. These larvae have every chance of entering by the skin or in the drinking water.

It was found that amongst the convicts 90 per cent. of the cases harboured *Necator* and the remaining 10 per cent. *Ankylostoma*. Of those of the free population who were infected, 75 per cent. harboured *Necator* and 25 per cent. *Ankylostoma*. Apparently all races, ages and sexes are affected alike. The cases are divided into three categories. The most numerous are those who have an infection without being in the least inconvenienced. Then there are the cases of infec-

tion in which the symptoms are chiefly those of some other disease, which possibly hide those actually due to the helminths. Finally there are the cases, happily least numerous, in which the condition of anaemia induced by the helminths is very intense. Many of these cases also suffer from malaria. During 1912 amongst the convicts 983 were found to harbour the worms. There were in all 81 deaths from disease and of these 24 appear to have died from uncomplicated ankylostomiasis. In about 22 per cent. of the cases there is a mixed infection with other helminths, either *Ascaris*, *Oxyuris* or *Trichocephalus*. The author met with a double infection of *Necator* and *Ankylostoma* nine times.

As prophylactic measures amongst the free population the following are recommended:—Education, protection of the exposed skin by bandages, washing of the hands before taking food, changing the clothes before sleeping at night, frequent disinfection of the working clothes with boiling water, careful guarding of the water supply from pollution, frequent distribution of quinine, the emphasising of the dangers of alcoholic excess, and energetic treatment of any persons infected.

For the convict population a similar series of recommendations is made with the difference that in their case compulsory measures can be enforced.

C. M. W.

GILL (C. R.). **Uncinariasis or Hookworm Disease. Being the Record of a Campaign in Porto Rico against the Hook Worm.**—13 pp. 1913. San Juan, Porto Rico.

In this paper the author points out that since ASHFORD'S discovery of uncinariasis in Porto Rico in 1899 an immense amount of work has been done there. The island has been divided into districts with an "anemia station" placed in each, under the charge of a "health officer," and here thousands of cases of hookworm disease have been regularly treated. The author, who has had nine years' experience of combating the disease, presents in this paper a report upon 316 of his last cured cases. By "cured" he means cases which have ceased to pass eggs in the stool. The facts in connection with the cases are set forth in a series of tables. His conclusions are:—

1. The great majority of patients are of the white race.
2. Both sexes are equally affected.
3. No age is exempt.
4. The haemoglobin percentage had an average of 10-40.
5. The clinical form was as a rule that of an intense infection, the symptoms being those of the severe anaemia.
6. Many of the patients had also *Ascaris lumbricoides* and *Trichocephalus dispar*.
7. The number of doses of vermifuge required to cure varied from 5-16.
8. The dose of Thymol varied from $\frac{1}{2}$ to $\frac{1}{4}$ gram for a child to 4 grams for an adult. The drug was given in powder form in gelatine capsules and in divided doses. It was always preceded and followed by a proper dose of sodium sulphate. Alcohol was forbidden as it dissolved thymol too rapidly.
9. The ova of the *Ascaris* and *Trichocephalus* often persisted after the hookworm ova had disappeared.

10. At the time of discharge the haemoglobin had always enormously increased.

Finally the author points out that at the commencement of the campaign in Porto Rico it was estimated that 90 per cent. of the rural population were infected. This proportion has now been reduced at least by half.

C. M. W.

LEVY (Robert L.). **A Case of Infection with *Agchylostoma duodenale* treated with Oil of *Chenopodium*** (With Demonstration of Specimens).—*Johns Hopkins Hospital Bull.* 1914. May. Vol. 28. No. 279. p. 160.

The case recorded is one in which thymol repeated three times failed to rid the intestine of hookworms. Accordingly oil of chenopodium was tried with good result. The patient starved for eight hours and was then given an ounce of Epsom salts. Two hours later 16 drops of the oil were administered in a teaspoonful of granulated sugar. Two further doses were given at two-hour intervals. Two hours after the last dose an ounce of castor oil and 50 minims of chloroform were taken. During the next 24 hours 19 worms were recovered, but eggs were still passed. Treatment was repeated again after 5 days when 7 more worms were expelled. There were no longer any eggs, but a further course was undertaken. The patient recovered rapidly and gained 30 lbs. in weight. The advantages of the drug over thymol are (1) it is more efficacious, (2) it is not unpleasant to take, (3) there are no disagreeable after effects, and (4) in therapeutic doses it is never toxic.

C. M. W.

CARINI (A.). **La Bonifica Umana nella Lotta contro l'*Anchilostomiasis*.** [The Gain to Humanity of a Campaign against Ankylostomiasis.]—*Rivista d. Igiene e d. Sanità Pubblica.* 1913. Vol. 24. 8 pp.

An appeal by the author, who is Director of the Pasteur Institute of San Paulo, in Brazil, to the authorities of that State to institute a campaign against ankylostomiasis, on the lines already adopted for malaria, by means of a systematic distribution of thymol, suitably made up into doses for self-administration. It is pointed out that, with a sparse agricultural population distributed over an enormous area, there is no other means of dealing with this evil effectively.

J. B. N.

RHO (F.). **La Lotta contro l'*Anchilostomiasis*. Problema nazionale e mondiale e più specialmente tropicale.** [The Campaign against Ankylostomiasis—a National & World-wide Problem, especially in the Tropics.]—*Ann. d. Med. Navale e Colon.* 1914. Feb.-Mar. Anno 20. Vol. 1. No. 2-3. pp. 218-226.

In this paper the author reviews the position of ankylostomiasis from the point of view of distribution, prophylaxis, diagnosis and treatment. He points out, what everyone knows, that its suppression is a national and world-wide question of greatest importance in the tropics.

C. M. W.

DE FARIA (Gomes). Ainda sobre o *Agchylostoma braziliense* (Gomes de Faria 1910). Resposta ao trabalho de R. Leiper: The Apparent Identity of *Agchylostoma ceylanicum*, Looss 1911, and *A. braziliense* (Gomes de Faria 1910). [A Further Note on *Agchylostoma braziliense*, etc. Reply to the paper of R. Leiper, entitled, etc.].—*Brazil Medico*. 1914. Mar. 22. Vol. 28. No. 12. p. 113.

Gomes de Faria, in this brief note, refers to LEIPER's suggestion (see this *Bulletin* Vol. 2, pp. 632-633), that *Ankylostoma ceylanicum* Looss 1911) and *A. braziliense* (Gomes de Faria 1910) are the same. In support of his contention that the two are distinct Gomes de Faria makes quotations from a letter from Professor Looss who is stated to have written in the following terms:—

A. braziliense has only a single tooth on each side which corresponds to the medium one of *A. duodenale*; the outer and inner teeth are completely wanting. *A. ceylanicum* has an inner tooth, which I now see to be frequently larger even than the one drawn in my *Ankylostoma* publication.

The length and slenderness of the bursal rays, especially of the external dorsal ray, is remarkable since in *A. ceylanicum* all the rays are thicker and plumper. The relative thickness of the bursal rays in similar species of *Ankylostoma* is a definite differential character but this point is emphasised by no recent writer. On the other hand one finds full descriptions of the arrangement of the rays which is the same for all *Ankylostoma*, and complete details of the terminal divisions of the dorsal ray which vary in nearly every individual.

In my opinion therefore *A. braziliense* and *A. ceylanicum* represent two independent and easily differentiated species.

C. M. W.

ASCARIASIS.

MACGREGOR (R. F.). *Ascaris Infection*.—*Indian Med. Gaz.* 1914. May. Vol. 49. No. 5. pp. 187-188.

The author records the case of a soldier from Tukdah, India, who had an attack which very closely conformed to the text-book descriptions of cholera. On examination of a smear of the faeces numerous *Ascaris* eggs were found. The patient was then given santonin after which numerous worms were either vomited or passed per rectum. The passage of the worms was often preceded by severe colic. In all 56 worms were recovered. The treatment lasted 20 days during which time the eosinophiles dropped from 20-25 per cent. to 19 per cent. A week later another worm was passed when the eosinophiles fell to 2 per cent.

C. M. W.

BORINI (Agostino). *Pseudo-Appendicite da Ascaridi*.—*Arch. de Parasit.* 1914. Mar. Vol. 16. No. 3. pp. 428-431

The case recorded is of a female patient age 21 years who appeared to be suffering from appendicitis. After a dose of castor oil and santonin two *Ascarides* were passed. As an examination of the faeces revealed numerous eggs the treatment was continued with the result that in all 32 worms were passed and recovery ensued. The symptoms appear to have been due to the presence of the worms in the caecum.

C. M. W.

GENERAL.

NIGERIA. Entozoa Infection in Northern Provinces, Nigeria.
[MANNING (F.), Principal Medical Officer.]—Received in Colonial Office Mar. 23, 1914.

The report contains an account of the results of an examination of 1,157 persons in 10 stations in Northern Nigeria for worm infections. Of these 601 or 52 per cent. were found infected. The table below shows the results at a glance.

TABLE "A."

District or Station.	Nos. examined.				Infected.			*Classification of Entozoa Infection.							
	Soldiers.	Prisoners.	Others.	Total.	Number.	Percentage to Total No. examined.	Cestoda.	Nematoda.							
								Ascaris lumbricoides.	Oxyuris vermicularis.	Strongyloides.	Ankylostoma.	Trichocephalus.	Schistosoma.	Other Entozoa.	
Lokoja ..	—	200	40	240	175	73	67	12	27	5	108	4	3	5	
Katagum ..	64	25	—	89	37	42	10	4	—	2	20	—	1	—	
Ibi ..	—	42	—	42	29	69	1	2	—	2	23	1	5	—	
Yola ..	—	40	32	72	22	31	10	4	—	—	1	1	—	6	
Baro ..	—	—	36	36	14	40	3	5	—	—	11	2	—	—	
Abinsi ..	—	—	23	23	9	39	2	1	—	—	3	—	—	3	
Naraguta ..	—	—	90	90	32	35	18	4	—	—	7	1	—	2	
Zaria ..	—	143	—	143	51	35	—	—	—	—	51	6	—	3	
Zungeru ..	—	340	—	340	201	59	47	15	31	4	168	14	—	—	
Ankpa ..	—	82	—	82	31	38	8	13	—	2	27	3	—	1	
Totals ..	64	872	221	1157	601	52	166	60	58	15	419	32	9	20	

*Includes dual and triple infection.

C. M. W.

MATHIS. L'Helminthiase, le Goitre, la Lèpre dans la haute Région du Tonkin (Langson-Caobang).—*Ann. d'Hyg. et Méd. Colon.* 1914. Jan.-Feb.-Mar. Vol. 17. No. 1. pp. 197-215.

As a result of the examination of a great number of natives of Upper Tonkin the author finds that helminth infections are exceedingly common as shown by the following table.

	Per cent.
<i>Ascaris lumbricoides</i>	60
<i>Trichocephalus trichiuris</i>	60
<i>Necator americanus</i>	30
<i>Clonorchis sinensis</i>	5

Anguillula intestinalis, *Taenia inermis*, and others, are less commonly found.

The most serious symptoms have been noted in connection with the *Ascaris* infections. Usually there are none, but occasionally there

is severe gastro-intestinal disturbance and in one fatal case perforation of the intestine, leading to general peritonitis and migration of the *Ascaris* into the peritoneal cavity, was noted. The authors frequently, with good results, gave santonin to individuals suffering from fatigue and showing vague intestinal symptoms. The dose given was 0.1 to 0.2 gram on three successive days just before the evening meal. On the fourth day 30-40 grams of castor oil were administered.

C. M. W.

PARROT (L.). **Parasitisme intestinal chez les Arabes du Tell algérien. Présence d'*Hymenolepis nana*.**—*Bull. Soc. Path. Exot.* 1914. Apr. Vol. 7. No. 4. pp. 301-303.

At Duzerville in Algeria the author examined 767 adult males for intestinal infections during March, April, May and December 1913, and January and February 1914. Of these 245 harboured helminths. *Trichocephalus* occurred in 22 per cent. (associated with *Ascaris lumbricoides* in 4.5 per cent.), *Ascaris lumbricoides* in 11 per cent., *Oxyuris vermicularis* in 0.4 per cent., *Taenia saginata* in 0.4 per cent., *Hymenolepis nana* either alone or in association with other worms in 1.5 per cent.

C. M. W.

NELIGAN (A. R.). **Helminthiasis.** [Correspondence.]—*Lancet.* 1913. June 6. p. 1649.

Attention is drawn to the frequency of the vomiting of round worms in Persia. The writer points out that the vomiting may be accompanied by such general disturbance as to lead to a diagnosis of much more serious maladies as for instance meningitis. Worm infections are exceedingly common amongst the Persians and in the north of Persia the common forms are *Ascaris lumbricoides*, *Oxyuris vermicularis* and *Taenia saginata* in this order of frequency.

C. M. W.

MACHT (David I.). **Two Cases of Helminthiasis (from the Out-Patient Department of the Johns Hopkins Hospital).**—*Johns Hopkins Hospital Bull.* 1914. Apr. Vol. 25. No. 278. p. 132.

Of the two cases recorded one was a man aged 25 who vomited a worm which was probably *Ascaris lumbricoides* as, after santonin treatment, some ten or twelve of these were passed per rectum; the second case was in a woman aged 21 who vomited a portion of a tape worm about one and-a-half yards long. The shock of this induced a miscarriage.

C. M. W.

LIMA (Armando R. V.). **Meio rapido para Revelar Ovulos de Parasitas intestinaes nas Fezes.** [A Rapid Method for Demonstrating the Eggs of Parasites in Stools.]—*Brazil Medico.* 1913. Oct. 22. Vol. 40. p. 427.

The author describes the following modification of TELEMANN's method for demonstrating the ova of parasites in stools. By the

original method portions of faeces of the size of a pea are shaken up with a mixture of equal parts of ether and hydrochloric acid. After passage through a sieve in order to strain off the grosser particles of food, the liquid is centrifuged for a minute. On standing, three layers are obtained, the uppermost consisting of ether and fatty substances dissolved in it, the second containing solid matters floating in the acid solution, the third a precipitate consisting mainly of fragments of cellulose, muscle-fibres and the eggs of parasites. Whilst finding this method serviceable the author thinks it a great improvement to substitute distilled water for the acid used by TELEMANN, as the ova and worms, if present, are then much more perfectly preserved.

J. B. N.

ARCHIV FÜR SCHIFFS- UND TROPEN-HYGIENE. 1914. Apr. Vol. 18.
No. 8. p. 292. *Oleum chenopodii* als Antihelminthikum.

A correspondence with Dr. WENDLANDT on the use of *Oleum chenopodii*. Children and adults take it well but when the urine contains albumin care must be exercised in its administration. It has acted very well against *Ascaris lumbricoides*, *Oxyuris vermicularis* and *Ankylostoma duodenale*. Three doses of 4-16 drops (according to age) in syrup are given at 8, 9, and 10 o'clock in the morning, followed at 11 by a dose of castor oil. Eight days later the treatment is repeated and in certain cases a third treatment may be necessary.

C. M. W.

SERUM REACTIONS, TOXINS, &c.

RACHMANOW (A.). *Lésions du Système nerveux dans l'Intoxication vermineuse*.—*Ann. Inst. Pasteur*. 1914. Feb. Vol. 28. No. 2. pp. 181-193. With 6 text figs.

The author has attempted by experimental means to find out if helminthic toxins produce lesions of the central nervous system. He has inoculated guinea-pigs with the body cavity fluid of *Ascaris megaloccephala*, extract of *Taenia plicata* and extract of sclerostomes of the horse. He has examined animals which have had repeated doses of the toxins and also animals which have had what he terms indirect intoxication or helminthic anaphylaxy.

He arrives at the following conclusions:—

1. The central nervous system of guinea-pigs does not always react to the toxins. Lesions are only found in cases in which clinical signs of poisoning were seen during life. Some animals can absorb considerable quantities of the toxins without showing any lesions whatsoever.

2. Where lesions occur in mild or subacute intoxication the nerve cells, the neuroglia cells and the fibres are all involved. Apart from varying degrees of chromatolysis the nerve cells often show a series of sinuous channels in their protoplasm. In more serious cases the nucleus is displaced to the periphery of the cell and has a deformed nucleolus. In severe cases the neurofibrils have disappeared. The cells of the neuroglia show varying degrees of "amoeboid" transformation. In severe cases abnormal numbers of neuroglia cells are collected about the nerve cells. The fibres of the white matter are swollen and have an irregular appearance.

is severe gastro-intestinal disturbance and in one fatal case perforation of the intestine, leading to general peritonitis and migration of the *Ascaris* into the peritoneal cavity, was noted. The authors frequently, with good results, gave santonin to individuals suffering from fatigue and showing vague intestinal symptoms. The dose given was 0.1 to 0.2 gram on three successive days just before the evening meal. On the fourth day 30-40 grams of castor oil were administered.

C. M. W.

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C. M. W.

NELIGAN (A. R.). **Helminthemesis.** [Correspondence.]—*Lancet.* 1913. June 6. p. 1649.

Attention is drawn to the frequency of the vomiting of round worms in Persia. The writer points out that the vomiting may be accompanied by such general disturbance as to lead to a diagnosis of much more serious maladies as for instance meningitis. Worm infections are exceedingly common amongst the Persians and in the north of Persia the common forms are *Ascaris lumbricoides*, *Oxyuris vermicularis* and *Taenia saginata* in this order of frequency.

C. M. W.

MACHT (David I.). **Two Cases of Helminthemesis (from the Out-Patient Department of the Johns Hopkins Hospital).**—*Johns Hopkins Hospital Bull.* 1914. Apr. Vol. 25. No. 278. p. 132.

Of the two cases recorded one was a man aged 25 who vomited a worm which was probably *Ascaris lumbricoides* as, after santonin treatment, some ten or twelve of these were passed per rectum; the second case was in a woman aged 21 who vomited a portion of a tape worm about one and-a-half yards long. The shock of this induced a miscarriage.

C. M. W.

LIMA (Armando R. V.). **Meio rapido para Revelar Ovos de Parasitas intestinaes nas Fezes.** [A Rapid Method for Demonstrating the Eggs of Parasites in Stools.]—*Brazil Medico.* 1913. Oct. 22. Vol. 40. p. 427.

The author describes the following modification of TELEMANN's method for demonstrating the ova of parasites in stools. By the

original method portions of faeces of the size of a pea are shaken up with a mixture of equal parts of ether and hydrochloric acid. After passage through a sieve in order to strain off the grosser particles of food, the liquid is centrifuged for a minute. On standing, three layers are obtained, the uppermost consisting of ether and fatty substances dissolved in it, the second containing solid matters floating in the acid solution, the third a precipitate consisting mainly of fragments of cellulose, muscle-fibres and the eggs of parasites. Whilst finding this method serviceable the author thinks it a great improvement to substitute distilled water for the acid used by TELEMANN, as the ova and worms, if present, are then much more perfectly preserved.

J. B. N.

ARCHIV FÜR SCHIFFS- UND TROPEN-HYGIENE. 1914. Apr. Vol. 18.
No. 8. p. 292. *Oleum chenopodii* als Antihelminthikum.

A correspondence with Dr. WENDLANDT on the use of *Oleum chenopodii*. Children and adults take it well but when the urine contains albumin care must be exercised in its administration. It has acted very well against *Ascaris lumbricoides*, *Oxyuris vermicularis* and *Ankylostoma duodenale*. Three doses of 4-16 drops (according to age) in syrup are given at 8, 9, and 10 o'clock in the morning, followed at 11 by a dose of castor oil. Eight days later the treatment is repeated and in certain cases a third treatment may be necessary.

C. M. W.

SERUM REACTIONS, TOXINS, &c.

RACHMANOW (A.). *Lésions du Système nerveux dans l'Intoxication vermineuse.*—*Ann. Inst. Pasteur.* 1914. Feb. Vol. 28. No. 2. pp. 181-193. With 6 text figs.

The author has attempted by experimental means to find out if helminthic toxins produce lesions of the central nervous system. He has inoculated guinea-pigs with the body cavity fluid of *Ascaris megalocephala*, extract of *Taenia plicata* and extract of sclerostomes of the horse. He has examined animals which have had repeated doses of the toxins and also animals which have had what he terms indirect intoxication or helminthic anaphylaxy.

He arrives at the following conclusions:—

1. The central nervous system of guinea-pigs does not always react to the toxins. Lesions are only found in cases in which clinical signs of poisoning were seen during life. Some animals can absorb considerable quantities of the toxins without showing any lesions whatsoever.

2. Where lesions occur in mild or subacute intoxication the nerve cells, the neuroglia cells and the fibres are all involved. Apart from varying degrees of chromatolysis the nerve cells often show a series of sinuous channels in their protoplasm. In more serious cases the nucleus is displaced to the periphery of the cell and has a deformed nucleolus. In severe cases the neurofibrils have disappeared. The cells of the neuroglia show varying degrees of "amoeboid" transformation. In severe cases abnormal numbers of neuroglia cells are collected about the nerve cells. The fibres of the white matter are swollen and have an irregular appearance.

3. In anaphylaxy of short duration (3-10 minutes) lesions of the brain and cord are not found. If, however, it has lasted half an hour or longer the same changes are found as in the case of subacute intoxication.

4. Anaphylaxy produced by horse serum exhibits exactly comparable lesions.

5. As the lesions of the nervous system produced by anaphylaxy are more marked than those resulting from direct intoxication it is probable that when nervous symptoms appear in cases of helminthic infection these are due to anaphylactic phenomena.

C. M. W.

WEINBERG (M.) & SÉGUIN (P.). **Propriétés phagocytaires de l'Eosinophile. Absorption de l'Antigène hydatique par les Eosinophiles démontrée par la Réaction de Fixation.**—*Compt. Rend. Soc. Biol.* 1914. May 8. Vol. 76. No. 15. pp. 715-717.

1. Further experiments on the phagocytic activity of the eosinophile cells are recorded. By injecting extracts of helminths into the peritoneal cavity of guinea-pigs an exudate rich in eosinophiles is produced. Into the cavity is then injected in saline solution a culture of *B. subtilis* or *B. coli*. It was found that the bacilli were all taken up by the eosinophiles before the polynuclear cells commenced to show any phagocytic phenomena. Similarly a subcutaneous eosinophilia was produced by injecting toxins subcutaneously. Shortly after the bacilli were injected into the same area and were again ingested by the eosinophiles. A marked eosinophilia in the blood can also be produced by injecting the helminthic toxins intravenously and the phagocytic powers of the eosinophiles can be demonstrated here also by injecting the bacilli intravenously.

2. In a previous publication the authors showed that the eosinophiles absorbed the toxins of helminths. They now record further observations in favour of this view. By using hydatid fluid they have shown that, in contact with the cells of peritoneal exudate which has been drawn off from guinea-pigs, the toxic properties are lost more rapidly when the exudate cells are in large proportion eosinophiles. Guinea-pigs may suffer naturally from an eosinophilia of the peritoneal fluid, but in this case the absorption of the toxic substances is not nearly so rapid as in the case of the peritoneal eosinophilia produced by intraperitoneal injections of helminthic toxins.

C. M. W.

WEINBERG (M.) & CIUCA (A.). **Anaphylaxie Hydatique Passive et Sero-diagnostic de l'Echinococcose.**—*Compt. Rend. Soc. Biol.* 1914. Mar. 6. Vol. 76. No. 8. pp. 340-342.

The authors have investigated from the point of view of anaphylaxy a total of 70 cases in which the clinical symptoms led to a suspicion of hydatid disease. The cases are divided into three groups. In the first group (20 cases) the serum of the patients gave a positive fixation reaction. In the second group (3 cases) the reaction was negative, while in the third group (36 cases) the diagnosis was discovered to be erroneous. Of the cases in the first group the serum of 18 produced in guinea-pigs a condition of passive anaphylaxy, while the serum of two was negative. The serum of two of the cases in the second group

produced a very decided anaphylaxy in the guinea-pigs. The sera of all the cases in the third group were negative. As a result of these observations the authors conclude that the production or not of anaphylaxy in guinea-pigs by the sera of patients will be useful in diagnosis of hydatid disease.

C. M. W.

GUERRINI (Guido). **Della Emoeosinofilia nelle Infestioni Intestinali Zoo-parassitarie.** [Eosinophilia in Helminthic Intestinal Infections.] —*Arch. de Parasit.* 1914. May. Vol. 16. No. 3. pp. 337-363. With 4 text figs.

The paper contains an account of experiments on pigeons and fowls with reference to the eosinophilia produced by helminthic infections due to *Heterakis maculosa*. As a result of these investigations the author finds that—

1. *Heterakis* infections of the intestine are able to give rise to an eosinophilia as high as 28·8 per cent.
2. The eosinophilia is the result of the worm infection for it disappears if the gut is cleared of worms by antihelminthic treatment.
3. The inoculation into the intestine of large quantities of extracts of the worms never produces an eosinophilia.
4. A marked eosinophilia can be produced by experimental injury of the intestinal mucosa by cauterisation with boiling liquid or wounding by the insufflation of powdered silica or glass.
5. It is very probable then that the eosinophilia found in *Heterakis* infections is due rather to the intestinal condition produced by the worms than to the action of substances elaborated by them and absorbed by the host.

C. M. W.

MISCELLANEOUS.

MOSS (Morris I.). **Intestinal Parasites (*Strongyloides intestinalis*) with Unusual Symptoms.**—*New York Med. Jl.* 1914. May 23. Vol. 99. No. 21. pp. 1035-1337.

The author describes the case of a man, aged 50 years, who had had several asthmatic attacks during the past 8 or 10 years. About 5 days before he was seen by the author the patient had an attack of dyspnoea which lasted a day. This was followed by diarrhoea alternating with constipation. There was great difficulty in urination. When seen the patient was suffering from spasm of the sphincter and on the seventh day after admission this became violent and ether had to be administered. The spasm was repeated more violently three days later so that the patient became cyanotic and showed symptoms of dyspnoea and inflammatory oedema. Nothing could be found to account for the condition. The blood condition showed anaemia and leucocytosis with eosinophilia. On examination of the faeces living *Strongyloides* were found. Treatment with Filix-mas and Thymol was without result. The patient became worse and died in an attack for which no cause other than the *Strongyloides* could be discovered.

C. M. W.

WALKER (Ernest Linwood). **The Life-History of *Oesophagostomum apistomum*; 1. Development outside of the Host.**—*Philippine Jl. of Science*. Sect. B. Trop. Med. 1913. Dec. Vol. 8. No. 6. pp. 501-505. With 4 plates.

In 1905 BRUMPT reported a case of oesophagostomiasis in a negro from the Omo River, East Africa. RAILLIET and HENRY (1905) named the worm *Oesophagostomum brumpti* while in 1910 they named another species *O. stephanostomum* var. *thomasi* found by THOMAS in a native of Manaos, Brazil. LEIPER in 1911 found six worms amongst others which had been collected by FOY from a native of Ibi, Northern Nigeria. LEIPER described these as *O. apistomum* Willach 1891 a species common in apes. He believes also that *O. brumpti* belongs to this species.

The disease in man is characterised by haemorrhagic cysts or tumours in the submucosa or muscularis of the large intestine which project both inside and outside the gut. At maturity the cyst ruptures and the adult worm escapes into the lumen of the gut. The author of the paper under review has studied the infection of *O. apistomum* in monkeys in the Philippine Islands.

The mature worm in the gut passes eggs which resemble those of the hookworm but are larger, measuring 0.044 to 0.057 millimeter in breadth and 0.073 to 0.084 millimeter in length. If powdered charcoal and, if necessary, a little sterile tap water are added to the faeces and the whole thoroughly mixed and spread in a thin layer in a sterile Petri dish, development will take place as in the case of hookworm ova. In such cultures the ova hatch in 12-24 hours and give rise to a rhabditiform larva 0.34 millimeter in length by 0.016 millimeter in breadth. The larva can be distinguished from other similar larvae of the hookworm or *Strongyloides* by its extremely long filiform tail and by the zigzag course of the intestine. The larva grows rapidly and moults twice during the next 3 or 4 days. At the second moult the skin is not shed but remains as an enclosing sheath within which the larva contracts somewhat in length and breadth so that it appears separated from the sheath by a space. The long filiform tail represented on the sheath vanishes at the last moult while the oesophagus has changed from the rhabditiform to the strongyliiform. The larva is now ready to infect a new host. It measures 9 millimeters long by .03 millimeter broad. The mode of entry of the larvae into the vertebrate host is not at present known but the matter is under investigation by the author.

C. M. W.

BERNARD (P. Noël) & BAUCHE (J.). **Influence du Mode de Pénétration cutanée ou buccale du *Stephanurus dentatus* sur les Localisations de ce Nématode dans l'Organisme du Porc et sur son Evolution.**—*Ann. Inst. Pasteur*. 1914. May. Vol. 28. No. 5. pp. 450-469. With 1 coloured plate and 2 figs.

This paper contains an account of investigations undertaken in Annam with the object of finding out the method of entry into the body of the pig of the worm *Stephanurus dentatus* which infects in Annam 34.6 per cent. of the pigs killed for food. In Annam the para-

site is harmless but in other parts of the world it has been described as exceedingly pathogenic. It occurs in the fatty tissue about the ureters and kidneys, sometimes in the liver and rarely in other organs. The eggs occur in the urine and for experimental purposes were obtained by centrifugation of urine removed from the bladder. Twenty-four hours after their introduction into water the eggs rupture and an embryo emerges. Five days later it undergoes metamorphosis and appears as a sheathed larva, which may survive as long as 50 days. If a drop of such culture is placed on the skin of the pig the larvae become actively motile and congregate about the openings of the hair follicles. Constant applications of the culture to the skin of the pig gives rise to a papular eruption like that produced by the larvae of the ankylostoma.

As a result of their investigations the authors find that infection may take place by way of the skin or by way of the digestive tract. The skin route leads to perirenal and periurethral infection, while the other leads to infection of the liver. Only those worms which occur about the ureters and kidneys attain maturity so that this is the situation of choice in the life-history of the parasite.

C. M. W.

BOOK REVIEW.

VAN BRERO (P. C. J.). [Vorm. Direktor der Staatsirrenanstalt zu Lawang (Java)]. *Die Nerven- und Geisteskrankheit in den Tropen.* [Nervous and Mental Diseases in the Tropics. MENSE *Handbuch der Tropenkrankheiten.* 2nd Edit. Vol. 2. pp. 679-726. 1914. [Leipzig, Verlag von J. A. Barth.]

Dr. Van Brero contributes a comprehensive and interesting monograph on nervous and mental diseases in the tropics. The article is based upon long experience at the State Asylum of Lawang, Java, combined with an extensive research on the literature of the subject. The author says: "Apart from Lepra and Beriberi—if we can consider these as nervous diseases—our knowledge is scanty concerning the extent and the nature of the symptoms and etiology of the various nervous diseases affecting people inhabiting tropical countries; the reason being that sufferers from these diseases seldom come under the care of European doctors." Such diseases as admit of a rapid diagnosis, for example, epilepsy and the residua of cerebral and spinal paralysis, are not so rare; and various functional neuroses, for example, hysteria have been described as occurring among primitive and semi-civilized races inhabiting tropical and sub-tropical countries. It is not surprising to learn that WITTENBERG met with tabes, multiple sclerosis, neuralgias, facial tic, hysteria, and epilepsy in South China.

The author refers to a still unexplained nervous disease described by WELLMAN in Angola, Portuguese West Africa, which is named by the inhabitants "Akatama." Apparently this is a form of neuritis, the symptoms of which are numbness, burning and stabbing pains in the limbs and erythema of the skin; it has nothing to do with beriberi; it may affect children or Europeans, but the native carriers whose principal source of nourishment is badly-cooked maize, are specially liable to it. BALFOUR saw a similar form of disease, called "Lahmes Kamel," in the Soudan. Dr. Van Brero states that neurasthenia is very prevalent among Europeans in the tropics. This is not entirely due to climatic conditions; other causes are frequently at work, e.g., malaria with prolonged treatment by quinine; alcoholism; and constipation with auto-intoxication. He points out, however, that long residence in the tropics lowers a European's resistance against alcohol and tobacco, and quotes TALES who states that one half of the American women and thirty per cent. of the men suffer with neurasthenia after a year's residence in the Philippines. A very interesting account is given by the author, from his own experience in Java, of the influence of a tropical climate on the physical conditions of Europeans born and reared in the tropics, and he remarks that an absolutely perfect example of a third generation of a tropical full-blooded European is unknown.

A description is given of Latah, a functional paroxysmal nervous disease brought on by fright, in which the patients are compelled, against their will and in spite of a feeling of repugnance so to do, to perform acts of deed and speech. The disease is met with especially in the Malayan Archipelago but is also found in other countries. An analogous disease, "jumping," has been described in the United States, Siberia and Lapland, so that it is not strictly speaking a tropical disease. A typical case is described by O'BRIEN:

"A Malay cook on board a local steamer, the butt of the crew on account of his disease, was daily subjected to their clumsy wit. One day as this cook was dangling his child, one of the crew came and stood before him with a billet of wood in his arms, which he began to toss up to the awning and catch again. The cook tossed his child up also, time for time. At last the sailor opened his hands wide apart and let the wood fall upon the deck. The cook immediately imitated him, missed the catch, and allowed the child to fall heavily upon the planks, from which it was picked up quite dead."

Van Brero points out that in Latah there is no amnesia, and the intelligence is unimpaired. Whether this applies to the disease during the height of paroxysm is doubtful. A hereditary predisposition exists in the sufferers

from this disease, a fright or a dream being only an exciting cause. It resembles in many respects hysteria, and is a neurosis in which suggestion plays an all-important part. Probably it affects the Malayan race in consequence of a predisposing mental constitution.

Van Brero devotes a page to "Tropenkoller," an expression used for a peculiar mental condition, said to arise in Europeans who live among savages in the tropics. It is said to follow malaria, heat stroke and general debilitating causes, but the condition is rather a criminal delinquency than a mental disease, and PEIXOTO describes it as "*fantasie des auteurs allemands exclusivement* made in Germany." Von Brero thinks that the principal cause of tropical frenzy is the personality of the individual when unrestrained by social conditions.

A chapter is devoted to heat-stroke, sun-stroke, and heat exhaustion, and it is pointed out that the affection is rare in the Dutch East Indies. Three theories of sun-stroke are given. (1) The thermic theory that there is an accumulation of heat with its effect on the tissues causing paralysis of the heat-regulating centres. (2) The actinic theory. According to CASTELLANI and CHALMERS it is not the ultra-violet rays that are active, but the blue and violet. (3) The microbic toxic theory.

From his own observations and practical considerations Van Brero would divide these diseases into two groups—sun-stroke in which the light rays of the sun exercise a special action on the body; and heat exhaustion, where the excessive degree of heat is the cause. Naturally the two causes are often combined, but heat-stroke may arise from other causes than the sun's heat. He then gives a description of the symptomatology and course of sun-stroke and heat-stroke, and remarks that in the Dutch East Indies psychoses as the result of heat-stroke seldom occur.

The author points out the many difficulties which he encountered in estimating the character of psychoses in tropical countries owing to the varied nomenclature employed. The percentage of insane in tropical countries, (e.g. the Dutch East Indies) is unknown. Many other difficulties arise in ascertaining the nature of the psychoses and their prevalence among the natives. Difficulties of language and suspicion of the motives of Europeans render any investigation very difficult. He concludes, however, that social and environmental conditions, such as habits and customs, have a much more important influence than climate. He describes two curious psychoses, Schamanism and Amok. Schamanen are persons of both sexes who possess the supposed power of harbouring spirits. They are found in various parts of the world, under different guises. They have mystic ceremonies with incense, monotonous dances, song and music. They pass into a state of ecstasy and in this state they are given to prophetic utterances. Amok—"to run amok"—is not peculiar to the Malay race. BLANDFORD saw analogous murderous onslaughts among the coolies in Trinidad, where it was attributed to the use of Bhang. The "amok attack" may show itself as a symptom complex in various degenerative psychoses, epilepsy, periodic mania, imbecility and idiocy, which forms of insanity can be shown to exist in such individuals. Gillmore ELLIS sees in the runners of amok a symptom of masked epilepsy. Evidently "amok runners" are in a state suggesting that they are not responsible for their actions, for they say, "I knew not what I did, it was black, red, before the eyes," and that they saw a tiger, a stag, a swine, a dog, or the devil, which they ran through. The attack is preceded by a more or less stuporose condition and followed by the same or by a deep sleep which is very suggestive of epilepsy. But this does not explain the peculiarity of race affection, nor why women are so rarely affected.

The chapter on the psychoses is especially valuable because of the author's long experience at the asylum of Lawang, Dutch East Indies. He calls attention to the fact that necessarily the delusions and obsessions of the civilised insane are coloured by the events of the period, and therefore may vary day by day. It is quite otherwise with primitive or half-civilised races, where the events of one day follow another with unvarying monotony, which, with the low intelligence and ignorance of such people, permits only of delusions and obsessions of a simple rudimentary character.

TYPES OF INSANITY AND THEIR ROTATION FREQUENCY IN NATIVES OF THE DUTCH EAST INDIES.

	Melancholia.	Mania.	Amentia.	Paranoia.	Hypochondria.	Hysteria.	Epilepsy.	Circul. Psychoses.	Period. Melanch.	Period. Mania	Period. Amentia.	Idiocy.	Imbecility.	Secondary Dementia.	Dementia paralytica.	Not diagnosed.	Totals.
Javanese ..	2	—	263	6	2	—	36	2	—	68	1	9	6	101	28	10	534
Sundanese ..	1	—	24	—	1	—	—	—	—	8	—	—	—	29	4	—	67
Madurese ..	—	—	23	1	—	—	1	—	—	3	—	—	—	6	1	3	38
Total ..	3	—	310	7	3	—	37	2	—	79	1	9	6	136	33	13	639
Percentage ..	0.5	—	48	1.1	0.5	—	5.9	0.3	—	12	0.16	1.5	1	21.3	5	2	—

DEATHS OF VARIOUS TYPES OF INSANITY AT LAWANG ASYLUM.

Cases of death in Natives at the Asylum, Lawang from July 1902 to May 1909.	Within 6 mos. or less than 6 mos.	Within 1 year.	Within 1½ years.	Within 2 years.	Within 2½ years.	Within 3 years.	Total.
Amentia	11	3	4	2	3	6	29
Periodic Mania	1	2	1	—	—	—	4
Paranoia	—	—	—	—	—	1	1
Hypochondria	—	—	—	—	—	1	1
Epilepsy	—	1	1	—	1	4	7
Idiocy	2	—	1	—	1	—	4
Secondary dementia ..	9	2	3	—	2	38	54
Dementia paralytica ..	7	3	6	—	—	4	20
Total	30	11	16	2	7	54	120

He noticed that masturbation, refusal of food, and suicide seldom occurred among the insane natives. Physical signs of degeneracy were most varied. Among the most obvious were anomalies of the skull and asymmetry. The insanities of the natives show characteristic indications of a degenerative neuropathy, e.g., periodicity, violent and dangerous outbursts, increased suggestibility. He gives two tables adopting the classification of MEYNERT, and showing the various types of insanity and their relative frequency, which are of sufficient interest to reproduce. It will be observed that amentia with stupor is comparatively frequent, secondary dementia and periodic mania are also common. An interesting fact observed is that "dementia paralytica" is met with in 5 per cent. of the admissions. Now it was said by Gillmore ELLIS that general paralysis is rarely if ever seen among Asiatics; it was also said that it did not exist in Egypt although syphilis was very prevalent, but we know now that over 6 per cent. of the admissions to the Cairo Asylum are general paralytics. Again, in Japan the incidence of general paralysis in Tokio Asylum has risen from 1.5 per cent. in 1888, to 15 per cent. in 1906. Van Brero explains why KRAEPELIN saw no paralytics at Buitenzorg. Probably in a measure it is a question of diagnosis and the difficulties attending the same, owing to the symptoms not being so characteristic; e.g. grandiose delusions are not so marked in the natives and mixed races as in the Europeans. Of 120 deaths in the Lawang Asylum (as the table shows) 20 were paralytics—1 in 6—relatively a normal percentage for the incidence of syphilis. Syphilis we know is the essential cause of general paralysis; if there were no syphilis there would be no general paralysis; and there can be no doubt that amongst savage and semi-civilised races where syphilis is very widespread and where skin and bone diseases are very common, general paralysis and tabes—these late manifestations of spirochaetal invasion—are rare. So that although it is not absolutely true to say that syphilitic infection with well-marked skin eruptions will not end in general paralysis, yet experience in countries where general paralysis is extremely common, supports the idea that cases which have well-marked skin and bone lesions do not subsequently develop general paralysis. Has the organism become modified owing to the widespread use of mercury in civilised countries, or is the dictum of KRAFFT-EBING true, "That general paralysis is a product of civilisation and syphilisation"?

The author next discusses malaria and, following KRAEPELIN, he divides the psychoses into three types: (1) "the pernicious delirious fever," with symptoms of headache, giddiness, noises in the ear and slight stupor occurring as prodromal symptoms, with a remitting or continuous course, mental confusion, delusions of persecution, hallucinations and illusions, restlessness with a tendency to suicide, passing on to coma, spasms, collapse and death, or sleep with more or less complete amnesia. These

symptoms occur sometimes before the feverish attack, or mostly end with it, or continue until the next attack.

(2) The 'typical psychosis' caused by quartan and tertian fever with a purely intermittent character; fever may be absent and the patient suffers with mental confusion, anxiety and delusions accompanied by hallucinations, illusions, irritability and violent outbursts.

(3) Psychoses of "malarial cachexia" with terrifying hallucinations, delusions of persecution, sudden violent outbursts, stupor and gradual lowering of intelligence, but possibly resulting in a cure after six to ten months. He also describes a neuritis which may come on as the result of malaria.

Lepra and ankylostomiasis are briefly dealt with. He does not consider that beriberi is ever accompanied by a Korsakow's psychosis, as was asserted by RODRIGUEZ of Brazil.

The most important habit poison of Asiatics is haschisch. Different preparations of the female plant of the Indian hemp which go under the name of Charas, Bhang, and Ganjah, are used in British India, Arabia, Asia Minor and adjoining countries of North Africa, and play a very important part in the production of mental disease in Mohammedan countries. Their psychic action may be divided into two stages. The first lasts about a quarter of an hour and consists of emotional excitement; this gives place to the visionary stage in which perceptual and memory pictures rise up in the mind's eye. This intoxication lasts two or three hours and rarely results in any unpleasant after-effect, as for example, vomiting. Consciousness is not thereby lost, for the patient is able to do unskilled work while under its influence, thus favouring the acquirement of the habit. Memory is disturbed after the intoxication, but in any case there is a feeling of pleasure such as occurs after pleasant dreams. There are three forms of mental disorder produced by the haschisch habit, (1) the acute hallucinatory form, (2) the acute motor form, and (3) the chronic form. WARNOCK has shown that Haschisch intoxication is a very widespread and common condition in Egypt, and that it plays the same part there as a factor in the production of insanity as alcohol does in England. It produces a moral depravity not unlike that of chronic alcoholism and this "Cannabinomania," as WARNOCK designates it, is a veritable plague to the people.

In conclusion I may mention that there is no reference to the nervous and mental symptoms of pellagra and trypanosomiasis. Probably they are dealt with fully in the articles on these important subjects. A full bibliography of references is given at the end of this valuable and interesting monograph on an extremely difficult subject.

F. W. Mott.

TROPICAL DISEASES BUREAU.

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[No. 3.

TUBERCULOSIS IN NATIVE RACES.

CHANDRA SEKCHAR (P. S.). **Prevention of Tuberculosis in Madras.**—*Proc. Second All-India Sanitary Conference held at Madras, Nov. 11th to 16th, 1912.* Vol. 3. Research. pp. 284-293. (1913. Simla: Govt. Central Branch Press).

This very disquieting paper brings forward considerable grounds for the belief that tuberculosis is not only very prevalent but increasing amongst the native population of India. The absence of reliable registration of deaths or any adequate vital statistics, except in the large towns, makes it almost impossible to assess the degree of prevalence of the disease, but the Annual Reports of the Surgeon-General, Madras, founded on the number of persons attending Hospitals only, show that the numbers diagnosed as tubercular have nearly doubled during the last ten years. Examination of the relatives of those coming for treatment leads Dr. Chandra Sekhar to the conclusion that for every consumptive diagnosed, there are at least two cases in the house in an earlier stage of the disease. Bovine infection can be practically ignored in a country where neither milk nor meat of cows is used raw, and it is certain that man is here the chief source of danger to man. Preventive measures are recommended as follows:—

- (1) Improvement of general sanitation.
- (2) Grouping of villages into 'village unions' for purposes of sanitation and statistics.
- (3) Improved building regulations in towns as well as in villages.
- (4) Education of the public in matters pertaining to health.
- (5) Early diagnosis and treatment of incipient cases of tuberculosis.
- (6) Prohibition of indiscriminate spitting.
- (7) Notification of infectious (open) cases.
- (8) Provision of consumption hospitals and sanatoria.

The question of tuberculosis in India is of incalculable importance and has not received anything like adequate consideration. As Dr. Sekhar says, "for a long time medical men in this country have been unwilling to recognise the prevalence of typhoid fever and tuberculosis amongst the native population of India. But during the last twenty years medical men have been gradually convinced of the existence of both these diseases amongst the Indians." It is at least probable that tuberculosis would have been recognised as common, if it had been

widely spread twenty years ago. The mere fact of medical examination of recruits for the Indian Army would have led to recognition of its prevalence. The average percentage of bodies presenting tubercular lesions post mortem in Madras General Hospital for 5 years is 13.56, a figure very much lower than that for Europeans as recorded by NAGELI and by BURGHART. There is much reason to think that the facilities of communication and the increase of urban populations, as well, perhaps, as the increased aggregation of children and youths in schools and colleges, have led to a recent and considerable spread of the disease amongst a population hitherto not very widely infected. If this is so, the manner of life of the poorer classes in India is such as to favour a still greater increase in the mortality from tuberculosis in the future. Much light would probably be thrown on the problem by ascertaining the percentage of positive v. Pirquet tuberculin reactions amongst clinically healthy persons in urban and rural areas. It is safe to assert that in a population hitherto comparatively free from tuberculosis and now exposed to infection under tropical conditions of life all the measures found necessary in Europe will be more necessary still. The recommendations of Dr. Chandra Sekhar should receive the gravest consideration.

S. Lyle Cummins.

Fox (C. J.). **Tuberculosis and its Relation to Public Health.**—*Proc. Second All-India Sanitary Conference held at Madras, Nov. 11th to 16th, 1912.* Vol. 3. Research. pp. 294-298. (1913. Simla: Govt. Central Branch Press).

Lieutenant Fox advocates notification of tuberculosis, the formation of anti-tuberculosis societies by the public, and adequate sanatorium accommodation for suitable cases, together with the establishment of tuberculin dispensaries in every town. Incidentally his description of the ideal Sanatorium for India throws a side light on the difficulties to be anticipated in applying such methods in the East. The purdah system has to be taken into account and, in preparing sanatorium accommodation for women, it will be necessary to provide room for female relations or companions, without whom it would be impossible for the patient to remain in the Institution, and a female staff of doctors and attendants.

[The recommendations, though sound in themselves, hardly allow sufficiently for the local difficulties.]

S. L. C.

SITSSEN (A. E.). **Enkele aantekeningen over het voorkomen van Tuberculose onder Inlanders in Batavia.** [Some Observations on the Occurrence of Tuberculosis amongst Natives in Batavia.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1914. Vol. 54. No. 1. pp. 47-65.

From a statistical enquiry compiled by the author from public records, tuberculosis would appear to be not uncommon amongst the native population of Batavia, Java. Its occurrence, however, seems to be generally overlooked from the comparative rarity of pulmonary phthisis. Out of 14 post mortem examinations made by the author on

patients in whom tuberculosis in some form or another was the cause of death, pulmonary phthisis was the immediate cause in only one-half, pleurisy and peritonitis furnishing the remainder. Out of a large number of post mortems on subjects dying from other causes, however, obsolete foci of tuberculosis in the lungs were found in about 50 per cent., showing that infection is common enough.

J. B. Nias.

HEINEMANN (H.). *Tuberkulose - Beobachtungen an javanischen Kontraktarbeitern*. [Tuberculosis among Javanese Contract Labourers.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1914. Vol. 54. No. 2. pp. 206-211.

The author finds in the paper by A. E. SITSEN (see above) an interesting contrast to and completion of his own and BAERMANN's observations on Javanese contract labourers in the plantations of Sumatra. SITSEN has shown that tuberculosis is very prevalent amongst the native-born inhabitants of Batavia, the bodies of persons dying from diseases other than tuberculosis showing old tubercular lesions in about half the cases post mortem. It would appear, then, that the disease has gained a firm footing in Batavia, as in many other tropical towns, while its course seems to tend to be of a rather chronic and benign type, as evidenced by the finding of healed apical lesions in clinically non-tubercular persons. All this is in marked contrast to the findings of the author and BAERMANN in Javanese labourers recruited almost entirely in the country districts. In 284 post mortems on clinically non-tubercular persons, only 4, or 1·4 per cent, showed old tubercular lesions. In 3,580 labourers submitted to the von Pirquet test, only 125, or 3·5 per cent, were found to give a positive reaction. The tubercle death rate from 17,000 men came to 3·47 per mille. These differences are not to be explained by saying that the labourers are specially selected men, because no care in selection can eliminate men with clinically undiagnoseable chronic apical lesions. It would seem to be a case of the phenomenon noted by DEYCKE in Turkey, "Widespread infection in the centres of civilisation (the towns) and but slight infection of the country districts."

With this low incidence amongst Javanese contract labourers goes a very marked susceptibility to tuberculosis, and a very high case mortality. From July 1st, 1912 to June 30th, 1913, Heinemann and BAERMANN treated 94 cases of tuberculosis from amongst the Plantation labourers. Of these, 59 died of the disease during the year, 10 more died, but as the result of intercurrent diseases, such as dysentery and ankylostomiasis, while 15 were sent back to their homes at their own request, still suffering from the disease and with a very bad prognosis. Of the 94 cases, only 9, and those with 'closed tubercle,' recovered so far as to be able to resume work. In this comparison of his own observations on the incidence of tuberculosis in the agricultural population of Java with those of SITSEN on the urban population of Batavia, Heinemann finds confirmation of the dictum of ROEMER that "the more widespread tubercular disease, the lower will be the case mortality from this cause." Probably as a result of the prevalence of the disease in Batavia, the incidence is beginning to increase in the country districts also and the tubercle death-rate has risen from

0.17 per cent. in 1907 to 0.6 per cent in 1913. To combat this spread of the disease, Heinemann advocates the erection of tuberculosis sanatoria and tuberculin dispensaries, and ultimately the provision of Homes for the incurable cases.

[To judge by recent papers on the subject, a similar contrast between the incidence of tuberculosis in oriental towns and in country districts, with a similar inverse ratio of susceptibility to incidence, is to be found in India, where a closer study of the distribution of tuberculosis by means of modern methods, such as the von Pirquet test, is greatly to be desired.]

S. L. C.

LÉGER. Recherches au Laboratoire de Bamako (Soudan français), sur l'Index paludéen, l'Index filarien, la Tuberculose et la Trypanosomiasse humaine.—*Ann. d'Hyg. et Méd. Colon.* 1914. Jan.-Feb.-Mar. Vol. 17. No. 1. pp. 77-81.

The application of the tuberculin cuti-reaction to 485 natives gave the following results :—

Age.				Number of Persons tested.	Reaction positive.	Per cent.
Children	{ From 0 to 1 year ..			64	0	0.00
	{ From 1 to 15 years ..			258	31	12.00
Adults	{ Men			76	6	7.89
	{ Women			87	23	27.58

The community at Bamako consists chiefly of the indigenous Bambaras and to a less extent of Moors attracted to the town by opportunities of trade. It is found that the latter are much more heavily infected than the former and Léger regards the Moors as the probable source of the cases occasionally to be found amongst the Bambaras. The danger to the local native is likely to increase in the future and should be provided against while there is yet time.

S. L. C.

LOISELET. La Tuberculose humaine à Madagascar.—*Rev. de Méd. et d'Hyg. Tropicales.* 1913. Vol. 10. No. 4. pp. 193-201.

The author considers that tubercular infections in Madagascar are caused by a naturally attenuated strain of the tubercle bacillus on the following grounds :—

- (1) The stage of cavitation is seldom encountered.
- (2) The bacillus displays granular degenerating forms sufficiently characteristic to be distinguished by the trained eye from the European organism.
- (3) Inoculation into the guinea-pig, even when intraperitoneal, fails to kill within the usual time, the animal frequently surviving for indefinite periods.
- (4) Culture is slow and not profuse.
- (5) Tuberculin treatment can be pushed with great rapidity in every

form of the disease, increases by tenths being tolerated without causing reactions. The treatment is, as it happens, successful in the local type of tuberculosis.

The Madagascar bacillus is as benign for the European as for the native, while the latter is severely affected by the European tubercle bacillus. Cases are described supporting the theory that the local strain is of low virulence.

S. L. C.

WHITE (G. Duncan). **Causes of the Prevalence of Pulmonary Tuberculosis in South-East China.**—*China Med. Jl.* 1914. Mar. Vol. 28. No. 2. pp. 71-83.

Although accurate statistics are not available as to the prevalence of tuberculosis in South-east China, certain facts can be adduced to support the very general impression that the disease is wide-spread in the country. In Hong Kong, where deaths are registered, one-ninth of the total death-rate is due to phthisis. The Chinese invariably desire to die at the homes of their ancestors, so there is a constant migration, from Hong Kong to inland villages, of persons suffering from illness likely to prove fatal. The phthisis death-rate recorded is therefore probably very far short of the actual numbers dying of this disease. Amongst the social customs making for the spread of tubercle are (1) the general condition of poverty of the lower classes, leading to underfeeding, etc., (2) the system of early betrothals leading to marriage of infected persons (3) the etiquette that confines young women to the house just when fresh air is so necessary to their health, and (4) overcrowding in badly ventilated rooms and the use of mosquito nets which retain much of the organic impurity added to the air during respiration. Opium, too, plays an important rôle in the propagation of the disease, by the expenditure on it of money required for good food, by its inhibiting action on the digestive functions, by diminishing the phagocytic power of the blood and by leading to the aggregation together of men in ill-ventilated opium-dens.

Cotton clothing, the prevalence of entozoa parasites such as *Ankylostoma duodenale* and *Paragonimus westermani* and the many causes that lower the resistance of persons resident in the tropics, all contribute to favour the spread of tuberculosis in Southern China.

S. L. C.

KRULISH (Emil). **Sanitary Conditions in Alaska. A Report upon the Diseases found among the Indians of South-eastern Alaska.**—*U.S. Public Health Rep.* 1914. May 22. Vol. 29. No. 21. pp. 1300-1304. With 8 figs.

The native population of South-eastern Alaska is about 5,200, of whom 2,494 were inspected. Of these, 197 or 7.9 per cent. were detected as suffering from tuberculosis. This included 135 cases of pulmonary disease, 36 osseous and 20 glandular affections, while 4 cases of laryngeal tuberculosis were seen. The author considers that, allowing for the "insanitary conditions which prevail in the majority of native homes harbouring tuberculous cases, the percentage of infection is remarkably low." It is mentioned that, once established, the progress of the disease is rapid, leading to a fatal termination, and that the

pulmonary type is characterised by a marked tendency to profuse haemorrhage. About 50 per cent. of the cases give histories of haemoptysis. An encouraging feature is that the cases respond well to open-air treatment if taken in time.

S. L. C.

MARRABLE (Harold T.). Tuberculosis in Persia and its Treatment by Koch's Tuberculin.—*Dublin Jl. Med. Science.* 1914. Jan. 3 ser. No. 505. pp. 1-19.

"Amongst the Persians some fifteen years ago pulmonary tuberculosis was practically unknown except in the coast towns bordering the Caspian on the north and the Persian Gulf on the south where the foreign element enters so largely into the population."

The disease appears to have been introduced by Armenians from India and has spread rapidly within the past five years.

"Until the treatment by tuberculin was commenced," the author had "never come across a case of spontaneous cure" nor seen any other than a fatal termination even when the case was treated as far as possible on Sanatorium lines. Appreciating the fact that this want of resistance to tubercular infection was due to the absence of any such acquired immunity as is possessed by persons brought up under the conditions prevailing in Europe, Dr. Marrable has worked on the lines of making good this deficiency by the use of tuberculin injections commenced as early as possible in the case. The results have been exceedingly favourable. The preparation preferred by the author is P.T.O. (Perlsucht-Tuberculin-Original), a bovine tuberculin supplied in a solution 250 times less concentrated than old tuberculin. He prefers to increase the doses as rapidly as possible, and, where the patient does not seem to be deriving the maximum benefit from the P.T.O., often finds that old tuberculin answers well as an alternative.

S. L. C.

PEIPER (Otto). Die v. Pirquetsche kutane Tuberkulinreaktion zum Nachweis der Tuberkulose und des Infektionsweges in unseren Kolonien. [Von Pirquet's Cutaneous Tuberculin Reaction as a means of demonstrating the Presence and Distribution of Tuberculosis in our Colonies.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Feb. Vol. 18. No. 3. pp. 93-97.

ZIEMANN (H.). Bemerkungen zu der Arbeit von Dr. Peiper "Die v. Pirquetsche kutane Tuberkulinreaktion usw." in Heft 3, 1914, des *Archivs.*—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Feb. Vol. 18. No. 4. pp. 133-136.

PEIPER (Otto). Entgegnung auf die Bemerkungen von H. Ziemann zu meiner Arbeit "Die v. Pirquetsche kutane Tuberkulinreaktion usw." (Heft 3, 1914 des *Archivs*) in Heft 4 1914 des *Archivs.*—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Apr. Vol. 18. No. 8. p. 274.

An important paper by H. Ziemann in the *Centralblatt für Bakteriologie* for August 4, 1913, (see this *Bulletin*, Vol. 3, p. 232) dealing with tuberculosis in the tropics, has led to a discussion between the author

and Dr. Otto Peiper as to priority in the application of von Pirquet's cutaneous tuberculin reaction in the mapping out of the distribution of tuberculosis amongst primitive tribes. The only question that can be regarded as open to discussion is that of individual priority as between Ziemann and Peiper, since it is beyond dispute that neither of these workers, great as has been the value of their respective contributions to the subject, can claim priority to either GROS or WAGON who had published accounts of the use of tuberculin tests in the tropics in 1908 and 1910 respectively. This is freely acknowledged by both Ziemann and Peiper. The latter, in his note of most recent date, enlarges the scope of his claim and points out that he also had priority of Ziemann in collecting together the literature on tropical tuberculosis, in dealing with the question of animal tuberculosis in the tropics, and in calling attention to the relative susceptibility of primitive peoples to the disease. Considering the dispute, then, as between Ziemann and Peiper only, there can be no doubt that Peiper has the priority of publication, and it is the universal custom to allot priority on this ground. Ziemann admits this and merely points out that he worked at the subject before Peiper, and had arrived at conclusions similar to those of the latter earlier than and quite independently of any other worker, though prevented by various causes from making his conclusions known in the medical press. It happens that this claim of Ziemann's can be substantiated by a reference to a conversation quoted by WOLFF-EISNER in his work "*The Ophthalmic and Cutaneous Diagnosis of Tuberculosis*" (1908: English translation, page 149) which is worth reproducing in full in this connection.

"The negro does not meet with tubercle bacilli in Africa and therefore in his native land he is free from tuberculosis. In other parts of the world, however, he exhibits an extraordinary tendency to contract tuberculosis. Ziemann himself, who is one of the best authorities on Africa, assured me that this was absolutely due to the fact that the negro in Africa does not come in contact with tubercle bacilli. Ziemann has never found tuberculosis in cattle in Africa. He has observed that, as soon as there is a tuberculous European living in Africa, the negroes living in his vicinity very easily take up the tubercle bacilli."

S. L. C.

FILARIASIS.

HUDELLET (G.). **Contribution à la Distribution Géographique de la Filariose en Afrique Occidentale française.**—*Ann. d'Hyg. et Méd. Colon.* 1914. Jan.-Feb.-Mar. Vol. 17. No. 1. pp. 115-123.

Of 2,274 soldiers examined, filariae were found in the blood of 792 by night and 264 by day, that is a general percentage of 46·4. The following table shows the number of people examined and infected from the different colonies :—

Colonies.	Examined.	Filariated.	Percentage.
Senegal	343	123	35·8
Guinea	872	392	44·9
Ivory Coast	327	233	71·2
Dahomey.. ..	102	43	42·1
Upper Senegal-Niger ..	605	251	41·4
Mauritania	2	0	—
Other Colonies	15	9	—

The species of filaria found are not here mentioned, but in another part of the paper a statement is made that *F. bancrofti* was encountered more frequently than *F. perstans* or *F. loa*. The latter is rare in French West Africa and the infections noted were generally in those who had lived in French Equatorial Africa. Another table gives the names of the towns and centres specially examined in the different colonies.

[Those specially interested in the subject should refer to the original for these tables.]

G. C. Low.

ROUSSEL (L.) & FOURCADE. **Recherche des Microfilaries au 2e Bataillon de Tirailleurs Sénégalais d'Algérie.**—*Rév. Méd. d'Alger.* 1914. May. Vol. 2. pp. 247-251.

The battalion of soldiers on whom the research was made came from Dakar; they had been recruited from the bend of the Niger and consisted of a variety of races. 752 men, 193 women and 29 children were examined for filariae. Of these 79 men (10·5 per cent.), 24 women (12·4 per cent.) and no children were found to be infected. The following table shows the species of parasite encountered :—

<i>F. bancrofti</i>	33
<i>F. loa</i>	1
<i>F. perstans</i>	61
<i>bancrofti</i> and <i>perstans</i>	2
<i>loa</i> and <i>perstans</i>	1
Doubtful	5

Reference is made to the papers of CAZANOVE, and MAROTTE and MORVAN. [See this *Bulletin*, Vol. 1, p. 82 and Vol. 2, p. 87.]

The authors state that albuminuria was frequent in the persons harbouring filariae and they also investigated the question of eosinophilia in seventy of the cases.

In faecal examinations (28 cases) the following ova were found:—*Trichocephalus* 3; *Taenia* [species not stated] 6; *Ankylostomes* 2.

Emetine, enosol and neo-salvarsan were tried for treatment, but, as the authors rightly point out, the physiological variability of embryos in the peripheral blood renders the interpretation of results obtained after giving these drugs doubtful.

G. C. L.

LÉGER. **Recherches au Laboratoire de Bamako (Soudan français) sur l'Index Paludéen, l'Index Filarien, la Tuberculose et la Trypanosomiase Humaine.**—*Ann. d'Hyg. et Méd. Colon.* 1914. Jan.-Feb.-Mar. Vol. 17. No. 1. pp. 77-81.

Filariasis.—Though symptoms of filariasis are very rare amongst the indigenous natives, yet embryonic forms of filariae—*F. loa*, *F. perstans* and *F. bancrofti*—are found in their blood comparatively frequently. Among 353 adult native prisoners examined at Bamako 32 cases of *F. bancrofti* infection were found (12·64 per cent.) and 17 cases of *F. perstans* (6·71 per cent.). Among 327 other natives, of whom the blood was examined during the day, 20 cases showed embryos of *F. loa* (6·10 per cent.) and 53 *F. perstans* (16·20 per cent.) The presence of so many carriers constitutes, according to the author, a danger which should not be neglected in the prophylaxis of filariasis.

G. C. L.

MATHIS. **Considération sur le Paludisme et la Filariose en Indochine.** [Clinique d'Outre Mer].—*Ann. d'Hyg. et Méd. Colon.* 1914. Jan.-Feb.-Mar. Vol. 17. No. 1. pp. 215-228.

Filariasis.—Filariasis in Indo-China is due to *Filaria bancrofti*, some of the infections being apparently compatible with health and without manifest symptoms or lesions. Where the latter are seen the localisation is usually about the genitals (hydrocele, orchitis, epididymitis, adenolymphocele).

Elephantiasis of the lower limbs is also common and a case of filariasis showing signs resembling beriberi is described. The author's conclusions are as follows:—

(1) The blood of all subjects presenting lymphatic oedema, hydroceles, orchitis and epididymitis of uncertain origin should be examined by night.

(2) A systematic examination of this sort should be pursued in native hospitals, for thus doubtful diagnoses may be cleared up.

(3) It is necessary to examine the blood on more nights than one because a single negative examination is not sufficient to exclude filariasis.

(4) As a prophylactic measure the destruction of mosquitoes should be carried out as far as possible because of their rôle in the propagation of the disease.

G. C. L.

BAHR (P. H.). **An Epidemiological Study of Filariasis in Ceylon.**—*Parasitology.* 1914. June. Vol. 7. No. 2. pp. 128-134. With 1 map.

The conclusions reached at the end of the study were:—

"(1) That of the four or five known species of filaria blood worms, only one of them, viz. *F. bancrofti*, is represented in Ceylon.

"(2) That its periodicity, as in the case with India, the West Indies and many other countries (but not in many of the Pacific Islands), is of a definitely nocturnal character.

"(3) That it is a rare parasite in the north and centre of the island, but a common one on the east and south coasts.

"(4) That in the endemic areas, the topographical distribution is apparently of a most capricious character.

"(5) That, whereas in some of the villages at least 26 per cent. of the adults are infected, in the neighbouring villages the inhabitants are quite free from the parasite and its associated diseases."

[The inequality of the distribution of filariasis has already been noted by Low for the West Indies and by others elsewhere. No explanation is at present forthcoming of the anomaly. As regards Ceylon the intermediate host of the filaria requires working out.]

G. C. L.

FÜLLEBORN (Friedrich). *Zur Technik der Mikrofilarienfärbung.* [The Technique of Microfilarial Staining.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1914. Apr. 25. Vol. 73. No. 6. pp. 427-444. With 2 plates and 3 text figs.

A paper dealing with the technique of microfilarial staining. The subject is discussed under the following headings:—

(1) Influence of different preparation methods on the length and shape of microfilariae.

(2) The dehaemoglobinising of thick drops of blood with distilled water, physiological salt solution and 60 per cent. alcohol.

(3) The influence of fixation and subsequent treatment in preserving the condition and thickness of the microfilariae.

(4) Fresh or vital staining.

(5) Researches on the constancy of the percentage length of the anatomical fixed points by different preparation methods.

(6) An appendix in which is given a description of the preparation methods quoted in the work.

As regards fixing methods the author mentions the following:—(a) five per cent. formalin solution; (b) the usual dehaemoglobinised films stained with haematoxylin either dried or when wet placed direct in alcohol; (c) specimens fixed wet with sublimate solution, hot alcohol or Looss's glycerine clearing method (1/20 glycerine to 60 per cent. alcohol allowed to evaporate and then glycerine gelatine). Looss's hot alcohol method is specially useful for fixing the larva in a stretched out condition.

As regards "vital staining" or, as Fülleborn now terms it, "fresh staining" (Frischfärbung) the methods by azur-eosin, neutral red and methyl green pyronin are given.

The constancy of the percentage length of the anatomical fixed points by different staining methods is shown in a table. The variation is very small, taking the nerve ring for example, only about 1.5 per cent. In the appendix as already mentioned the different methods of preparation are quoted in detail. It is not necessary to refer to all of those, but as the carbol methyl green pyronin staining

is a new one, it may be given here. Dried thick drops of blood are (1) dehaemoglobinised for a short time with physiological salt solution, (2) the specimens are then stained with Pappenheim-Unna's carbol methyl green pyronin mixed with salt for about half an hour or even longer, (3) they are then quickly passed through alcohol, this differentiating and dehydrating the films, (4) after Xylol they are mounted in cedar wood oil or, if permanent preparations are required, in Canada balsam.

Carbol methyl green pyronin can be obtained from GRÜBLER's in Leipzig. The paper is illustrated with micro-photographs and there is also a coloured plate which shows the effects of the different stains.

G. C. L.

FÜLLEBORN (F.). **Ueber die Lage von *Mikrofilaria loa* (diurna) im Trockenpräparat.** [On the Position of *Microfilaria loa* (diurna) in Dry Preparation.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Apr. Vol. 18. No. 7. pp. 232-234. With 2 plates and 1 text fig.

The author refers to the position taken up by the embryonic forms of *Filaria bancrofti* and *F. loa* in dried preparations. MANSON first pointed out this peculiarity and often used it for clinically differentiating the two embryos. Fülleborn [see this *Bulletin*, Vol. 1, p. 87] pointed out that *F. bancrofti* embryos, when dried on a slide in a damp tropical climate, might take up the usual position of *loa* embryos. He now shows in a series of micro-photographs that *loa* embryos may present the rounded convolutions so typically seen in those of *bancrofti*.

Recently in the case of a native of Kamerun, in whose blood embryos of *loa*, *bancrofti* and *perstans* were present, the opportunity of comparing their different positions occurred. Thick specimens were made in the usual manner and stained with haematoxylin. Photographs taken from these show that in many instances reliance on position alone is uncertain, the only method of coming to a correct diagnosis being a comparative study of the different anatomical points present in each of the embryos.

G. C. L.

JOHNSTON (J. E. L.). **Observations on Variations in Form of Microfilariæ found in Man.**—*Ann. Trop. Med. & Parasit.* 1914. Apr. 21. Vol. 8. No. 1. pp. 73-80. With 1 plate.

Whilst the author was in Bassa Province, Northern Nigeria he had under his care a N'doma pagan fifty years of age who complained of pain in the back like lumbago. A few weeks later swelling of both feet and legs appeared, with pains from the knees downwards. Ankylostome ova were found in scanty numbers in the stools. An examination of the blood showed embryonic filariæ of three definite types. (1) Embryos varying in length from 83 to 170 μ without sheaths, actively motile with a tapering posterior extremity ending in a bluntly pointed tail; (2) Embryos of 230 to 251 μ resembling the above closely but having a very sharply pointed tail; (3) Embryos about 300 μ in length, sheathed, apparently *Filaria loa*.

The author discusses what these are, a plate showing the different characteristics of the embryos being given. The blood was taken during

the day and the material upon which the observations were made was scanty.

[In the author's preliminary remarks on the sheathless filarial embryos which have been found in man, numerous mistakes occur. (1) *Filaria demarquayi* is said to have periodicity, this is not so; (2) *Onchocerca volvulus* is stated not to have been found in the blood. Apparently the author has not seen FÜLLEBORN's, SIMON's and RODENWALDT's recent papers on Filariasis, either in the originals or in the abstracts made in this *Bulletin*. An examination of his (Johnston's) plate shows that the small filaria with the blunt tail is *F. perstans*, long and short varieties of which have been described before, while the other filaria with the sharp tail and no sheath exactly resembles the pictures given by RODENWALDT, and in its measurements is evidently the same as that described by FÜLLEBORN and SIMON, namely *Onchocerca volvulus*. It is also unfortunate that the scheme proposed by FÜLLEBORN as regards measurements of the different anatomical points has not been followed. The descriptions given by the author are exceedingly difficult to follow.]

G. C. L.

JOHNS (Foster M.) & QUERENS (Percy L.). **Further Note on the Growth of Filarial Embryos in Vitro.**—*Amer. Jl. Trop. Diseases & Preventive Med.* 1914. Mar. Vol. 1. No. 9. pp. 620-624. With 1 plate.

In a former note one of the authors—Johns in collaboration with WELLMAN—announced the cultivation of filarial embryos *in vitro*. The present authors now refer to a criticism by Low on this paper [see this *Bulletin* Vol. 1, pp. 420-421], and agree with him that the term "cultivation" is an improper one. They cannot agree however with the observations of BACH as to there being no increase in length in embryos kept *in vitro*. They repeated their previous experiments and obtained the same results in the case of embryos of *Filaria immitis* and also obtained a greater development with a filarial embryo from an endemic infection of cattle, which they believed to be *Setaria labiato-papillosum*. Their results summed up were as follows:—In dextrose defibrinated blood from the dog, prepared and inoculated as previously outlined in detail, at a temperature of 37° C., the embryos of *Filaria immitis* exhibit growth and motility for a period of about fifteen days, when the media and organisms begin to disintegrate. The development is characterised by an increase in size of from 155·6 μ by 4·3 μ to 264·5 μ by 5·7 μ with generative changes which according to the authors denote some development.

In similar cultures from the blood of cattle, at a temperature of 37° C., the embryos of *Setaria labiato-papillosum* exhibited growth and motility for a period of 52 days, when degenerative changes began to take place in both media and organisms. The development was characterised by an increase in size and a commencing development of what appeared to be a visible alimentary tract, mouth parts, and terminal spicule. The authors at present are not in a position to interpret what these changes mean.

G. C. L.

KÜLZ (L.). **Beitrag zur Turnusfrage der Mikrofilarien.** [The Periodicity of Microfilariae.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Apr. Vol. 18. No. 7. pp. 248-250.

At the end of 1905 Külz whilst in South Kamerun became infected with *Filaria loa*. After a lengthy stay in home climates he went to New Guinea in August 1913. He thought it would be interesting therefore to see if the periodicity of the embryos changed from what was observed in Kamerun and at home. In both these geographical positions the parasites had a diurnal type, coming into the blood between seven and nine in the morning, reaching their maximum at three in the afternoon, and disappearing again at nine at night. For his observations he took 0.05 cc. blood, two and a half times the amount recommended by Low and FÜLLEBORN, because of the small number of filarial embryos present in his blood. The preparations were dehaemoglobinised in the usual manner and stained with haematoxylin.

Though the periodicity showed some fluctuation and tendency to become variable in New Guinea, yet the type remained diurnal. The number of filariae in the blood in home climates appeared, however, to be less than in the tropics and the author thinks that this was not mere chance. Whilst in New Guinea the number of filariae in the peripheral blood from different parts of the body was estimated—finger, fore-arm, upper-arm, ear, and leg below the knee. No appreciable differences were found in the numbers.

Experiments with light, heat etc., were also carried out, with results as follows:—

(1) Direct sunlight: left fore-arm exposed for $\frac{1}{4}$ hour to the mid-day sun; right fore-arm in the shade—no difference.

(2) Cold: hand held for ten minutes in ice water; reduction of the number of filariae to half of that in undipped hand.

(3) Influence of heat: (a) locally by bringing the hand into water of a temperature of 45° C. No change. (b) warm bath of 35° C. of ten minutes duration. No change.

(4) Passive hyperaemia of upper-arm: number increased well over one-third in comparison to that of the normal arm.

A table showing the different geographical points where the periodicity was tested is given.

G. C. L.

DUTCHER (B. H.). **Recovery of Embryo of *Filaria bancrofti* from Blood from the Lung during Daytime.**—*Jl. Trop. Med. & Hyg.* 1914. June 1. Vol. 17. No. 11. p. 163.

A soldier of the Porto Rican Regiment entered hospital February 16th, 1914, suffering from a mild attack of whooping cough. Between 9 a.m. and 10 a.m. on February 20th he coughed up a small quantity of pure blood embedded in mucus. The author examined this and found that filarial embryos were present in it. He believes this is the first time that such parasites have been obtained from the lungs in the living subject.

[There is no proof that the blood did come from the lung and, as there is no record given in the paper of an examination of the peripheral blood at the same time, this must remain uncertain. A night examination of peripheral blood would also have been interesting in demonstrating the heaviness or lightness of the infection.]

G. C. L.

MARTINEZ (I. Gonzalez). **Fatal Attack of Filarial Lymphangitis simulating Bubonic Plague.**—*Jl. Amer. Med. Assoc.* 1914. May 23. Vol. 62. No. 21. pp. 1622-1624.

A child, aged ten, seriously ill was admitted into the Quarantine Hospital at San Juan, Porto Rico on January 28th supposed to be suffering from plague.

The onset of the attack had been associated with rigors, hyperpyrexia, thirst and later vomiting; finally delirium, stupor and profuse diarrhoea set in.

At the examination nothing was found physically, with the exception of two slightly enlarged and very painful glands in the right groin. The urine however contained red blood cells, epithelial cells, hyaline and granular casts, and a trace of albumin. Blood examinations made the same night at 9 p.m. showed numerous filarial embryos. The child died at 3 a.m. next morning.

At the autopsy no evidence of plague was found. The enlarged glands when dissected out were seen to be red and congested and enclosed in a gelatinous substance—the inflammation spreading up under Poupart's ligament along the line of the iliac vessels into the abdominal cavity.

Liver, pancreas and spleen were normal, but the kidneys were congested and enlarged, as were also the mesenteric and retroperitoneal glands.

The author concludes from the clinical signs and post mortem changes that the case was one of pernicious filarial lymphangitis.

G. C. L.

U.S. PUBLIC HEALTH REPORTS. 1914. May 29. Vol. 29. No. 22. p. 1347. **Plague and Filariasis. The Possibility of Mistaking one for the other.**

CREEL, representing the Public Health Service in Habana, has called attention to the fact that in localities where filariasis occurs isolated cases of bubonic plague might be mistaken for it. Such a case is mentioned as having occurred in San Juan, Porto Rico in 1912, the diagnosis at first being made as one of filariasis. Cases of filarial lymphangitis on the other hand simulating bubonic plague [see above] have recently been reported by MARTINEZ in the same island.

[In severe cases of filarial lymphangitis the possibility of mistake might certainly occur.]

G. C. L.

ZIEMANN (H.). **Bemerkungen zu Prof. Külz. Archiv, Bd. 18. Heft 5. S. 164.**—*Archiv. f. Schiffs- u. Trop.-Hyg.* 1914. Apr. Vol. 18. No. 7. pp. 235-236.

Ziemann replies to KÜLZ's remarks on his paper on Tropical Tissue-Inflammations caused by Filarial Infection [see this *Bulletin* Vol. 3, p. 317.] He brings forward no new facts. Those specially interested in the subject should consult his original paper and also his subsequent remarks.

G. C. L.

WERNER (H.). **Phenokoll bei Filarienerkrankung und Bilharziosis.**
 [Phenokoll in Filariasis and Bilharziosis.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Apr. Vol. 18. No. 8. pp. 284-285.

Two cases of filarial disease and one of bilharzia were treated with phenokoll. A Bantu negro from West Africa, in whose blood embryos of *Filaria perstans*, *loa* and *bancrofti* were present, received 0.2 gram intravenously. The numbers of the three different species of microfilariae circulating in the blood were not influenced by this injection. No better results were obtained later when another injection of 0.5 gram was given.

In a case of Calabar swelling, without embryonic filariae in the blood, phenokoll given internally in a dose of 0.5 gram, three times a day, produced no effect on the clinical symptoms.

In the case of bilharzial disease the drug appeared to have no effect on the production of the eggs of the parasite.

G. C. L.

ELEPHANTIASIS.

ROYSTER (Hubert A.). **Elephantiasis and the Kondoleon Operation.**—*Jl. Amer. Med. Assoc.* 1914. May. 30. Vol. 62. No. 22. pp. 1720-1722. With 2 text figs.

The patient, a mulatto, aged 23, was seen by the author in Raleigh, North Carolina, December 1913, suffering from elephantiasis of the right leg. Born in Virginia, he had lived in Florida and South Carolina. The condition commenced in the summer of 1911. After going over carefully all the procedures proposed for the relief of elephantiasis the author decided to adopt KONDOLEON'S operation [see this *Bulletin* Vol. 1, p. 93]. "For four days previous the man was put to bed; each day the leg and foot were scrubbed in a strong mercuric chlorid solution, bandaged tightly with a Canton-flannel roller and kept elevated on pillows. As a result of this, the leg was reduced in size about two inches. January 3, 1914, the operation was performed as follows: A long incision was made through the skin on each side of the leg, extending from knee to ankle. Wide retraction of the integument was secured by dissecting it back freely from each edge of the incision. Going from above downward, the deep fascia to the width of three fingers was dissected off the muscles and cut away in one piece of the length of the wound. Also, the same area of subcutaneous tissue was removed by splitting it off the skin. The muscles were laid bare and free hemorrhage occurred, requiring many ligatures. The skin was stitched back in position, dressings applied and the leg bandaged without a splint."

"One week later the first dressing revealed primary union, except at the lower third of the incision on the outer side of the leg, where sloughing of the skin edges had occurred."

As an auxiliary treatment thiosinamin (fibrolysin) was given hypodermically every three days. So far sufficient time has not elapsed to predict what the final result will be. A photograph of the leg before and three months after the operation is given.

[The author's comments on the etiology of the case show a complete absence of knowledge of the subject of filariasis. Further, MATA'S

statement which is quoted that "Even in these tropical latitudes, where elephantiasis is common (Barbados leg), its association with filariasis is not as frequent as one would suppose" is quite incorrect. There is nothing against this case having been a filarial one].

G. C. L.

GROTHUSEN. **Zur operativen Behandlung der Elephantiasis scroti.** [Operative Treatment of Elephantiasis scroti.]—*Arch. f. Schiff-s- u. Trop. Hyg.* 1914. Apr. Vol. 18. No. 7. pp. 250-252.

The author refers to KUHN and GUEHNE's method of dealing with the tunica vaginalis in elephantiasis of the scrotum. (*Arch. f. Schiff-s- u. Trop.-Hyg.* 1913. Vol. 17. No. 13, p. 457). He suggests some further modifications of this method and thinks that these may be useful as regards the healing of the flaps. Though he admits that the skin may become necrotic, yet he has not seen such a result in many years' experience.

G. C. L.

PATTERSON (James). **Elephantiasis, with a Report of a Case.**—*Jl. Amer. Med. Assoc.* 1914. Mar. 21. Vol. 62. No. 12. p. 916. With 1 text fig.

A case of elephantiasis occurring in a patient who had never been in the Tropics is reported. Such cases are not uncommon, [see this *Bulletin* Vol. 1, pp. 93 and 94]. The statement that the case was harbouring *Filaria bancrofti* is not borne out by the diagrams, the structures depicted there having no resemblance to such a parasite.

G. C. L.

WILLS (E. F.). **Lymphangioplasty in Elephantiasis.** [Correspondence.]—*Brit. Med. Jl.* 1914. Mar. 21. p. 652.

The author tried HANDLEY's lymphangioplastic operation upon a case of elephantiasis complicated with severe leg ulcers. Fairly thick Chinese silk was used, the threads being entered just above the ulcers and brought out above the knee; two different routes were employed. The results were most striking, a new growth of epidermis being visible on the ulcers next day and a rapid cure resulted.

G. C. L.

LEBER (A.) & V. PROWAZEK (S.). **Zur Kenntnis der Elephantiasis in Samoa.** [Elephantiasis in Samoa.]—*Arch. f. Schiff-s- u. Trop.-Hyg.* 1914. Vol. 18. No. 11. pp. 386-394. With 3 text figs.

A somewhat long paper on elephantiasis in Samoa. The question of the relationship of "Mumufieber" with elephantiasis is discussed and a case is quoted which would seem to show that such a relationship does exist. The question of the deep muscle abscesses which are so often found in filariasis regions is also gone into in detail.

The authors only saw cases of elephantiasis in the later years of life but they quote TURNER as having seen it in a five year old child and a nine year old boy. UTHEMANN saw a case of elephantiasis of the scrotum in a nineteen year old native of Samoa.

A list of literature for filariasis in Samoa is given.

G. C. L.

BAHR (P. H.). **Demonstration on Elephantiasis and Filariasis.**—*Trans. xvii International Congress of Medicine*, London, 1913. Sect. xxi. Trop. Med. & Hyg. Part. 2. pp. 295-296.

A series of remarks explanatory of a microscopical demonstration on elephantiasis and filariasis. The author believes that the adult filaria after its death becomes calcified and continues to act as an irritant, producing fibrosis in and around the lymphatic tissues in which it is lying.

When the adult worms inhabit the glands these become extensively fibrosed and, according to the author, are found much less resistant to septic organisms. This question of glandular fibrosis may explain the frequent absence of microfilaria in the blood in elephantiasis and other filarial diseases in which the adult filaria itself is the primary factor.

G. C. L.

ANIMAL FILARIASIS.

YAKIMOFF (W. L.), SCHOKHOR (N. I.), KOSELKINE (P. M.), WINOGRADOFF (W. W.), & DEMIDOFF (A. P.). **Recherches sur les Maladies Tropicales Humaines et Animales au Turkestan. V. La Microfilariose des Chevaux au Turkestan.**—*Bull. Soc. Path. Exot.* 1914. Mar. Vol. 7. No. 3. pp. 189-192.

Embryonic filariae possessing a sheath, a column of cells and three colourless spots, and measuring 270 to 323 μ in length (without the sheath) by 7.10 to 11.3 μ in breadth were found in the blood of Turkestan horses. No periodicity was noted. Similar parasites have been observed in the blood of such animals by BALFOUR in the Sudan, LINGARD in India, MARTINI in Berlin, MANDEL and MAZZANTI in Germany and by WIRT in Austro-Hungary. [Until the adults of this filaria have been found it is premature to describe it as a new species].

G. C. L.

DELANOË (P.). **Au Sujet de l'Existence chez un Saurien, *Agama colororum* Dum. et Bibr., d'une Filare et d'une Microfilare Sanguines.**—*Bull. Soc. Path. Exot.* 1914. Feb. Vol. 7. No. 2. pp. 121-125.—With 26 figs.

The parasites were observed in a "Margouillat," a species of lizard captured at Bouaké on the Ivory Coast. The embryonic forms measured 190 μ long by 6 μ broad and were enclosed in a sheath. The extremity of the tail was blunt. Eight adult filariae were found at autopsy, all of these being females. They were coiled up in a mass in the liver, but had not produced any apparent signs of degeneration in the organ. They measured 12-13 cm. in length and 0.275 mm. in breadth. They were filiform and of a white colour.

RODHAIN in 1906 described in an *Agama colororum* on the Oubangui embryo filariae. These were also sheathed but differ from Delanoë's in their measurements, only measuring 89 μ with the sheath, and 66 μ without it. Further, the adults in these cases were found in the subcutaneous tissues between the skin and the muscles.

G. C. L.

RAILLIET & HENRY. *Filaria furcata*. [Correspondence.]—*Bull. Soc. Path. Exot.* 1914. Mar. Vol. 7. No. 3. p. 175.

RAILLIET and HENRY who have examined the adult filariae collected by SULDEY from a chameleon in Madagascar [see this *Bulletin* Vol. 3, p. 317] have determined that the parasite is *Filaria furcata* von LINSTOW, 1899.

The species of chameleon which harboured the filariae has been determined by ROULE, Professor of the Museum of Natural History, as *Chamaeleo oustaleti* Mocq.

G. C. L.

YAKIMOFF (W. L.) & SCHOKHOR (N. I.). *Recherches sur les Maladies Tropicales Humaines et Animales au Turkestan. IV. Les Micro-filaires des Animaux Domestiques au Turkestan.*—*Bull. Soc. Path. Exot.* 1914. Mar. Vol. 7. No. 3. pp. 188-189.

A table shows the percentage of domestic animals, infected with filariae, found by the authors in different localities of Turkestan. 22 per cent. of camels, 3.3 per cent. of donkeys, 2 per cent. of mules and 15 per cent. of cattle at one or other locality harboured these parasites. The number of animals examined is not stated.

G. C. L.

DRACONTIASIS.

YAKIMOFF (W. L.). *Recherches sur les Maladies Tropicales Humaines et Animales au Turkestan. VI. La Formule Leucocytaire du Sang des Malades renfermant Filaria medinensis.*—*Bull. Soc. Path. Exot.* 1914. Mar. Vol. 7. No. 3. p. 192.

A number of bloods of people harbouring *Filaria medinensis* at Bokhara were examined; the following table gives the results of a series of differential leucocyte counts:—

	1.	2.	3.	4.	5.	6.
Polymorphonuclears ..	35.0	51.6	60.7	54.9	47.6	33.6
Large mononuclears ..	5.1	—	3.5	—	6.1	3.3
Lymphocytes ..	45.4	36.0	29.7	31.0	33.6	42.9
Eosinophiles ..	9.9	17.2	2.4	12.0	5.4	14.6
Transitionals ..	2.5	3.2	3.5	0.5	0.3	6.1
Mast cells ..	—	—	—	0.5	0.3	—
Myelocytes ..	1.9	—	—	0.5	6.4	—

[The relative increase of the eosinophiles is well shown in the above table. The percentages however are not correct, the total figures being above or falling short of a hundred.]

G. C. L.

HEAT STROKE.

PEMBREY (M. S.). **Heat-Stroke. Further Observations on an Analysis of Fifty Cases.**—*Jl. R. Army Med. Corps.* 1914. June. Vol. 22. No. 6. pp. 629-638.

This paper is a continuation of Dr. Pembrey's analysis of 50 cases (see this *Bulletin*, Vol. 2, p. 647). The author invites attention to the divergence of opinion still existing in the services as to the identity or otherwise of heat-stroke and sun-stroke, contrasting the statement of Leonard ROGERS that two separate conditions exist, the one syncopal and caused by the direct rays of the sun, the other hyperpyrexial, following high atmospheric temperature, with the opinion of Colonel SIMPSON, A.M.S., and Major W. H. OGILVIE, I.M.S., that there is no essential difference between the two conditions. Pembrey himself concludes that the actinic rays of the sun are only an indirect factor in the causation of heat-stroke, inasmuch as they necessitate the wearing of heavy clothing by Europeans in hot climates, leading to "extravagant sweating," as compared with the "economical sweating" of the pigmented and lightly clothed natives. The loss of water by sweating may be very great. "Four men during a march of seven miles in drill order lost by sweating an average of over three pints (per man) of water. . . . The healthy body maintains its percentage of water at a constant level, and any excessive loss by sweating must be compensated sooner or later by drinking. . . . It is unwise, therefore, to restrict drinking; a normal thirst is the call for water to maintain the reserves in the tissues." A distinction is drawn between heat-stroke, where the skin is dry, and heat-exhaustion, where there may be excessive sweating. It is possible, where the nervous control of the secretory system is paralysed, as in some toxic states, to have increased vascularity and temperature of the skin without any sweating. It is possible that some unusual product of metabolism, elaborated under the influence of high temperature, may, by acting on the nervous system, induce this condition in heat-stroke. Dr. Pembrey is evidently anxious to avoid any dogmatic expression of opinion on a subject where much close observation and research is still required, but we may be permitted to read between the lines and extract the general tendency of his suggestions as to etiology. Everything points to the mischief being due to a breakdown of the powers of the human organism to regulate its temperature under conditions of great atmospheric heat. The regulating mechanism consists on the one hand of a central nervous control, and on the other of the sweat-secreting mechanism of the skin-surface, acting under the influence of the nervous system. The regulation of body-heat may therefore be interfered with either by the action of abnormal products of metabolism on the controlling centres, or by abnormal external conditions, such as saturation of the air in contact with the skin-surface, which, by preventing evaporation, renders nugatory the activity of a still efficient secretory mechanism. Or again, the secretory apparatus itself may be inefficient, as in the case quoted from ZUNTZ and TENDLAU by Pembrey in his previous article, where the skin was devoid of sweat-glands and the man had to regulate his

temperature by soaking his shirt with water and allowing it to evaporate. It is probable that there is a considerable difference between individuals in their power of adjusting their temperature, and it is certain that a given individual varies in this respect from time to time, the power of heat-regulation being capable of increase by gradual training and liable to diminution under conditions of debility, alcohol, etc. Bearing these points in mind, the rational treatment is to lower the temperature by the application of cold, the use of iced enemata, and the application of ice to the head and neck being especially useful. Diaphoretics are generally without effect. "The success of the treatment by cold is strong evidence in favour of the view that heat-stroke is due to a disordered regulation of temperature produced by heat; the failure of antipyretic drugs can be considered as evidence against the bacterial theory of SAMBON." The measures of prevention must be directed to diminishing the production and increasing the loss of heat. Important amongst the former are progressive training, and lightening the equipment or load, as far as possible, during marching or hard work, while amongst the latter are suitability of clothing, marching in open order where possible, ventilation of rooms and an adequate supply of drinking water. "The guidance afforded by the wet-bulb thermometer is more important than that of the dry-bulb. Further attention might be drawn to its indications, which would serve as a warning for special precautions by night as well as by day." The paper contains interesting notes as to the after-effects of, loss of efficiency following, and the cause of death during attacks. The incidence of heat-stroke, sun-stroke and heat-apoplexy in the United Kingdom, India and the Colonies from 1902 to 1906, and of heat-stroke and sun-stroke from 1907 to 1911 (the diagnosis of heat-apoplexy having been dropped after 1906) are given in the form of a table for which the original should be consulted.

[If the percentage of sun-stroke to the total be worked out from the table, the possible error due to the elimination of heat-apoplexy in 1906 does not invalidate this, as such cases were almost certainly added to heat-stroke and not to sun-stroke from 1907 onwards—it will be found that this tends to be fairly constant, only two large variations from the mean (27.7) being found in the ten years examined. This tendency to a constant proportion of sun-stroke cases is difficult to explain if the distinction between heat-stroke and sun-stroke is merely one of fortuitous circumstance.]

S. Lyle Cummins.

SIMPSON (R. J. S.). *Humidity and Heat Stroke.*—*Jl. R. Army Med. Corps.* 1914. July. Vol. 23. No 1. pp. 1-11. With 2 figs.

In this paper Colonel Simpson examines how far the dictum of HALDANE, that "in still and warm air, what matters to the person present is . . . the temperature shown by the wet bulb thermometer," is applicable to the actual conditions in tropical climates. After a consideration of the factors involved in the alterations in the temperature of a body with an evaporating surface, under the influence of a fluctuating atmospheric temperature and humidity, it is shown that, with the same wet bulb temperature, there may be either a relatively high air temperature with rapid evaporation or a

relatively low air temperature with slow evaporation. "So that a constant wet bulb temperature does not define a constant condition, but one where the rate of evaporation varies as well as the air temperature." Turning now to the rate of evaporation, this is determined by three factors, the temperature, the amount of water vapour present in the surrounding air, and the rate at which the saturated layer of air in contact with the evaporating surface is renewed, i.e. the amount of ventilation. In order to coordinate these factors with the incidence of heat-stroke, the instruments used to compute them should be exposed as nearly as possible under the same conditions as the persons under observation. The fallacies that arise are due to the facts that the temperature of the wet bulb thermometer is not influenced by clothing or by exercise, and is not, therefore, strictly comparable to the human being who is subject to these influences; that meteorological observations are not made contemporaneously with the occurrence of cases of heat-stroke; nor are the elements recorded always strictly comparable. In the *Journal of the Royal Army Medical Corps*, 1908, Vol. 10, p. 25, Leonard ROGERS, in a paper of the highest importance, worked out the relationship of the temperature and moisture of the atmosphere to the incidence of heat stroke, using as the basis of his enquiry the incidence of the disease in the British Army in India during three consecutive years and the records of the Bengal Meteorological Office, from which it was possible to obtain the maximum, minimum and mean temperatures and the relative humidity at the places and for the days on which the cases had occurred. Colonel Simpson makes use of these data to ascertain the correlation between the wet bulb temperature and the incidence of cases (ROGERS had worked out a percentage of cases under each 10 degrees of moisture for the different mean temperatures). The wet bulb temperature might be worked out from ROGERS's data by means of tables but the author finds it simpler to plot out the humidity lines for various combinations of wet and dry bulb temperatures, the result being shown in Fig. 1, in which, if a line be drawn horizontally from the air temperature scale (on left) to the space between the appropriate humidity lines, the wet bulb temperature is vertically below on the bottom scale. The incidence figures of ROGERS are inserted opposite the recorded air temperatures (mean) and as near the lower limit of the humidity space as possible. Their position as regards wet bulb reading is thus made diagrammatically apparent. In order to have at his disposal a method of finding the absolute humidity corresponding to the various temperatures and relative humidities, Colonel Simpson has constructed Fig. 2. "The horizontal scale of temperature is constructed by plotting the weights of water per cubic metre, and marking the points so obtained with the corresponding temperatures. The increased water content with rising temperature is seen by the widening of the spaces for equal increments of temperature towards the left. The hypotenuse is divided evenly, expressing grammes of water per cubic metre by intervals of five grammes, through which horizontal lines are drawn cutting the temperature and humidity lines. The vertical scale on the left (relative humidity) is evenly divided into ten parts representing differences of ten per cent. Each point is joined to the apex of the triangle on the right by a line which cuts all the temperature lines at points where the relative humidities are the same. Hence we have

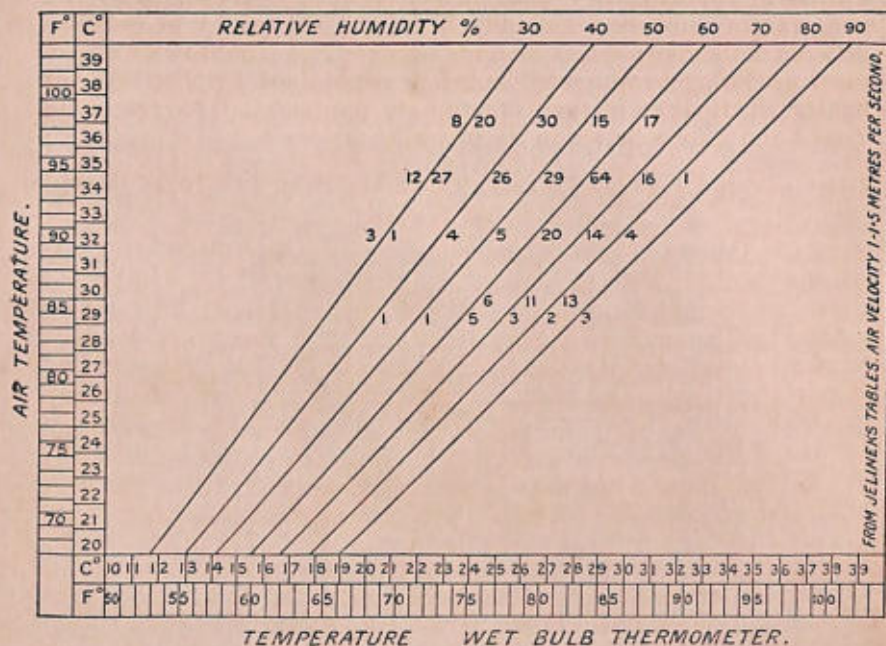


FIG. 1.

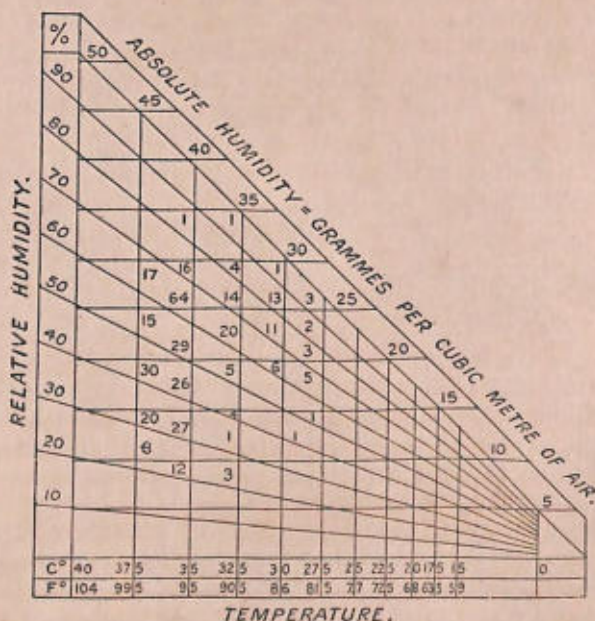


FIG. 2.

[Illustrating summary of SIMPSON'S paper. Reproduced by permission from the *Journal of the Royal Army Medical Corps*, 1914, July.]

a series of approximately diamond-shaped spaces determined by two temperature lines, two humidity lines, and crossed by or included between lines representing weights of water." The distribution of cases according to absolute humidity is obtained by inserting the figures of ROGERS in their appropriate positions. The results of Figs. 1 and 2 are collected in the following table:—

DISTRIBUTION OF ROGERS' CASES, TABLE II, PART 2. TOTAL CASES.

(a) Wet Bulb Temperature.

Degrees F.	Number.	Percentage.
68-70	5	1.4
70-73	40	11.1
73-76	37	10.2
76-79	51	14.1
79-82	94	26.0
82-85	97	26.4
85-90	39	10.7
	363	99.9

(b) By Weight of Water per Cubic Metre of Air, in Grammes.

Grammes.	Number.	Percentage.
5-10	23	6.3
10-15	54	14.9
15-20	72	19.8
20-25	80	22.1
25-30	132	36.3
30-35	2	0.5
	363	99.9

"The steady increase (of incidence) up to wet bulb temperatures of 76°-79° F. and absolute humidities up to 25 grammes per cubic metre, with a marked increase beyond these limits, is well marked." The author concludes that the results are quite consonant with those of HALDANE's experiments. HALDANE's results, then, are applicable to the ordinary climatic conditions of hot climates. Observations on the following points would be useful:

- Skin temperatures at work and during rest.
- Rectal temperatures synchronous with (a).
- Skin-shirt layer temperatures, avoiding contact with the skin.
- Temperatures of the outer surface of the clothing taken in the shade and as far as possible fit for comparison with (a), (b) and (c).

S. L. C.

WANHILL (C. F.). Factors which may influence the Production of "Heat-Stroke" among Troops on the March or on Service.—*Jl. R. Army Med. Corps.* 1914. June. Vol. 22. No. 6. pp. 661-664.

In the course of some observations on the relative values of red and white linings for helmets, Major Wanhill had occasion to compare the temperatures inside these helmets when exposed to the sun

and was speedily convinced that not only the direct rays have to be taken into account, but also the heat reflected from walls, the ground and surrounding objects, especially those placed at a level below the edge of the helmet. The great influence of air-currents in reducing the temperature inside the helmet leads the author to lay stress on the importance of proper ventilation around the space between the rim and the head. While the vital question of suitable body-clothing and the regulation of sweating must take the first place, this note on the temperature of the air inside the helmet has a definite importance as throwing light on a detail that is apt to be forgotten. The therapeutic value of direct application of cold to the head and neck makes it probable that the temperature of the air directly in contact with the head is important in prophylaxis also.

S. L. C.

WOOLLEY (Paul G.) *Insolation. Its Prophylaxis and Treatment.*—*New York Med. Jl.* 1914. June 13. Vol. 99. No. 24. pp. 1165-1168.

After a review of the theories of Insolation, a short account of the experimental work of RUBNER on the relative importance of radiation and conduction in the elimination of heat from the body, and a description of ARON's work on the effect of direct sun rays on animals, Dr. Woolley concludes that heat-exhaustion, heat-stroke and sun-stroke are merely different degrees of the same condition. He thinks that a classification of cases into mild, severe and hyper-acute would answer all purposes in the present state of our knowledge. Granting that the essential factor in etiology is heat retention due to a failure in the heat-regulating mechanism of the body under conditions of high atmospheric temperature, still another fact of fundamental importance is that "abnormal substances are being produced continuously because of the increased temperature of the body and that these abnormal products (or products in abnormal amounts) are not being eliminated with sufficient rapidity to ensure the body against their deleterious action." To prevent attacks the skin should be kept clean to allow of free sweating, clothes should be suitable, the diet light, alcohol forbidden, plenty of water or citrous drinks should be taken, fatigue, worry, heavy work, and so forth should be avoided. In treatment, while reiterating the importance of cold applications as a means of reducing the raised body-temperature, the author lays great stress on the value of measures directed to encouraging elimination of toxic substances, at the same time replacing the water lost through excessive sweating. For both the latter purposes nothing is more valuable than infusion of saline solution. For rectal use the following is recommended.

Sodium chloride	30 grams.
Sodium carbonate (chrySTALLINE)	20 grams.
Water	1,000 cc.

"The injection should be given slowly enough to allow retention. The time consumed in injecting a litre should not be less than one hour." For intravenous injection a solution of about half the strength of the above is said to be of great value and should be intro-

duced very slowly. In apyrexial attacks of heat-exhaustion, explained by ARON as due to sudden loss of large quantities of water, treatment should be eliminative and stimulating, the infusion of saline solution especially offering a prospect of success. Stress is laid on the need for special precautions by persons recovered from attacks of insolation.

S. L. C.

GROBER. **Behandlung akut bedrohlicher Erkrankungen. Ein Zyklus klinischer Vorträge. VI. Behandlung des Hitzschlags, des Sonnenschlags und der Starkstromverletzungen.** [Treatment of Heat-Stroke, Insolation, and Shock from Electrical Discharges.]—*Deut. Med. Wochenschr.* 1914. Jan. 1. Vol. 40. No. 1. pp. 1-3.

There is nothing in the treatment recommended for the first two conditions that should be new to the worker in the tropics except one rather surprising statement to the effect that it is often worth while to continue artificial respiration for many hours where the breathing has stopped as a result of either heat stroke or insolation. Cases are even said to have recovered after ten or twelve hours of such treatment.

[If such cases have been accurately observed and if the fact is as clearly established as the author gives us to understand, then a decided modification of the opinions usually held by English medical men in the tropics is called for, as the persistence in attempts to re-establish respiration must very seldom be continued for anything like these periods. Artificial respiration, continued for half an hour, is advised in the latest edition of CASTELLANI and CHALMERS, and the experience of Army Surgeons in India and elsewhere is in accord with the latter view. The point is one of great importance as, while this divergence of opinion exists, heavy responsibility rests on those called upon to treat the disease.]

S. L. C.

SEGALE (Mario). **Sulla Termocalorimetria del Colpo di Calore.** [On the Thermocalorimetry of Heat-Stroke.]—*Pathologica.* 1913. Oct. 15. Vol. 5. No. 119. pp. 597-602. With 7 charts.

Where a number of cases of heat stroke occur simultaneously and a common factor is sought, it is generally found that there has existed a high but not necessarily excessive temperature, a temperature, in short that makes possible the saturation of the atmosphere with moisture. This has been noticed by GRANDIS in Buenos Aires, where many cases arose with a temperature of 39.8° C. and a humidity so great that salt and Carlsbad salt deliquesced in contact with the atmospheric air, and by LAMBERT at New York in a series of 805 cases occurring with a temperature of 36.5° C. and a humidity amounting to 70 per cent. of saturation.

Following up his observations on the influence of a humid atmosphere and a raised temperature on the body, GRANDIS carried out experiments on the influence of saturation of the air on the elimination of CO_2 from the lungs, and showed that the latter became steadily less as the degree of saturation of the air became greater. As a deduction from this observation, GRANDIS concluded that hyperpyrexia might arise under similar atmospheric conditions as a

result of the physical factors of the patient's environment. He inferred (1) that where the air is saturated with moisture and its temperature the same as that of the patient, respiration will no longer withdraw heat from the body, because all vaporisation of water from the respiratory surface will have ceased, and with it the rendering latent of heat that forms part of the process of vaporisation. The result will be an actual rise of body heat. (2) Further, when the air is saturated and at a temperature higher than that of the body there will be a tendency to a cooling of the air actually in contact with the respiratory surface of the pulmonary alveoli and, as a consequence, a condensation of moisture on this surface, leading to a liberation of heat and a further addition to the temperature of the patient. Professor Segale, in the paper under review, attempts to bring direct experiment to bear on this hypothesis, and describes a method by which he has been able to record the effect of humidity of the atmosphere, in conjunction with (1) a normal and (2) a raised temperature, on guinea pigs placed in a calorimeter, records being taken of their fluctuations in temperature throughout the experiment. A number of interesting charts illustrate the paper. The author's conclusion is that the hypothesis of GRANDIS is correct. The results of his experiment are as follows:—

Whilst at a temperature of 39° C. with a dry atmosphere a guinea pig lives indefinitely, showing a constant level of emission of heat, at the same temperature and with a humid atmosphere a guinea pig dies, actually absorbing heat from the atmosphere. Finally, at a temperature of 45°–46° C. in a non-saturated atmosphere, the emission of heat is marked and continuous, tending to rise until the moment of death. From the clinical facts and the results of experiment, the following conclusions are drawn:—

(1) Heat-Stroke finds its principal causes and the conditions necessary for its production when the body is exposed to high temperature together with marked humidity of the atmosphere.

(2) Under such conditions, without any initial change in the thermogenetic activity of the body, there is a practical cessation of "loss of heat," leading to a raised temperature. In addition to this cessation of loss of heat there may be a further gain, the body taking up more heat from the air, as already explained.

S. L. C.

BOPPE & ORTICONI. Syndrome méningé consécutif à une Insolation Simulant une Méningite cérébro-spinale.—*Arch. de Méd. et de Pharm. Militaire.* 1914. Feb. Vol. 63. No. 2. pp. 209-212. With 1 temperature chart.

An interesting case of Insolation simulating cerebro-spinal meningitis is described in detail by the authors. The point that appears to contrast most markedly with typical attacks of insolation is the length of time that elapsed, after the exposure to sun or heat influence, before symptoms developed. The soldier took part in a severe march on a very hot day (34° C. in the shade) and succeeded in reaching camp without falling out. In the evening he developed a violent headache, was obliged to remain lying down next day, and on rising to urinate on the following night, suddenly collapsed and had to be taken to hospital, where he showed all the symptoms of cerebro-spinal meningitis. The latter disease was excluded by an examination of the cerebro-spinal fluid. The patient recovered completely in a few days.

S. L. C.

BERIBERI.

SHIBAYAMA (S.). **The Present State of the Study of Beri-Beri in Japan.**

—*Trans. xvii Intern. Congress of Med.* London. 1913. Sect. xxi.

Trop. Med. & Hyg. Pt. 2. pp. 87-90.

During the Russo-Japanese War a severe epidemic of beriberi broke out in the Japanese army and a Commission was formed to study the cause and prevention of the disease. The author and two others were sent to the Dutch Indies and the Straits Settlements to observe the disease as seen there. During a five years' investigation many reports have been published dealing with (1) the experimental study of the beriberi-like disease in birds; (2) prevention of beriberi by cured rice, or a mixed diet of rice and barley; (3) epidemiological observations. With regard to the first, the Japanese experimenters were divided into two groups, some thinking that the avian and human diseases were identical, but the majority disagreed on the ground that although beriberi presents similar symptoms and pathological conditions to a certain degree, it does not always do so, and that birds develop rigidity of the neck, which is never found in human beriberi; moreover the substances which cure birds act less effectually on man. The following table is given to show that neither "the cured rice nor the mixed diet of rice and barley is able absolutely to prevent the disease, though they seem to play some part." [From the figures it would not be unjustifiable to replace "some" by "very important."]

Main Diet.	No. of Inhabitants experimented on.	No. of Patients.	Per- centage.
Cured rice	657	8	1.22
Rice (6 parts)	534	19	3.56
Barley (4 parts)			
White rice (control) ..	710	64	9.01

In cities the disease is never epidemic, but among coal miners, fishermen, railway labourers and prisoners it is often very severe, breaking out in epidemic form from time to time. The disease prevails among those who use rice as their staple diet, but all the labourers who eat rice and live under similar conditions do not suffer. It is also pointed out that a seasonal prevalence is well marked. The disease begins to appear in May or June and is worst in July, August and September, disappearing in the cool autumn; it breaks out heavily one year, and may not be present in the next under similar dietetic and hygienic conditions. In summing up the author states that the Japanese investigators have not yet been able to arrive at any conclusion. Though faulty diet may give rise to the onset of the symptoms, it cannot be regarded as the cause of the disease, the general opinion being that it is due to an "intoxication by a poison which is produced by a certain kind of micro-organism in the human body, especially the intestine."

P. W. Bassett-Smith.

DUBOIS (A.) & CORIN (G.). **Rapport sur une petite Epidémie de Béri-béri à Bokala (Congo Belge).**—*Bull. Soc. Path. Exot.* 1914. May. Vol. 7. No. 5. pp. 402-405.

Small epidemics of beriberi have been frequently notified from Western Africa, though rarely from the Congo district. The one here described consisted of nine cases, all of which were benign in character. The signs and symptoms of each of these are briefly given—consisting of pains in the legs, oedema, abolition of reflexes, tachycardia and precordial pains; ankylostome ova were commonly present, but were of secondary importance. These nine cases were from among 199 employees and they commenced to appear at the end of the dry season. After their removal to the hospital at Leopoldville no fresh cases occurred. The use of rice in the diet had been stopped four or five months before the onset of the epidemic. The rations were abundant at Bokala, consisting mostly of manioc with addition of fresh meat at least once a week, also vegetables and fruit—being better than those given at Leopoldville. Believing the disease to be caused by an infective agent, DUBOIS attempted to produce the condition experimentally in man and animals. Six men in late stages of trypanosomiasis, but free from any signs of beriberi, were injected subcutaneously with 1-2 cc. of citrated blood from two of the cases of beriberi, none of these developed any signs of the latter disease. A guinea-pig was also inoculated with 10 cc. of blood, with negative results. The authors state that these results agree with the experiences of others; yet they do not prove that beriberi is non-infectious, but only that the infectious stage has ceased on the appearance of the symptoms, or that the infective agent is localised in the digestive tract.

P. W. B.-S.

MIDDLETON (E. M.). **A Case of Beriberi complicated by Duodenal Ulcer.**—*Jl. R. Army Med. Corps.* 1914. May. Vol. 22. No. 5. pp. 589-591.

A sapper, who in September 1912 had been operated on at Dover for gangrenous appendicitis, was on recovery sent to Sierra Leone. Six weeks after his arrival he was admitted to the hospital there with beriberi and was invalided to England. The symptoms of the disease, except for a loss of patella reflexes, had all cleared up in three months, but he was again admitted to hospital, this time with evidences of duodenal ulcer, from which he died.

[The description is too meagre to be able to state definitely that this man had true beriberi, which is hardly likely to have been contracted in so short a time in a man direct from England. The disease too is uncommon in Sierra Leone.]

P. W. B.-S.

FENTON (E. G.). **The Etiology of Beriberi.**—*Brit. Med. Jl.* 1914. April 25. p. 914.

In Southern Nigeria, where the author has had considerable experience, a form of polyneuritis is more or less constantly present. He states that among the Krooboys, who generally had a half-starved appearance when joining, but after a few months got both fat and

strong, each batch would produce a few of these cases, some of whom died. Their diet was to a large extent polished rice, but was supplemented with many extras; one cook prepared the food for all. A fair number of Europeans who did not use rice suffered from the same disease; in these there was some oedema besides the neuritis; only one died, who would not leave the endemic area, the fatal result being from sudden heart failure with cyanosis. The author states that if these were not true beriberi as found in the Far East, there must be some form of endemic polyneuritis not hitherto described.

P. W. B.-S.

BRADDON (W. Leonard). **On Some of the Results of Measures taken against Beriberi in British Malaya.**—*Trans. xvii Intern. Congress of Med.* London. 1913. Sect. xxi. Trop. Med. & Hyg. Pt. 2. pp. 91-114.

In this long and interesting paper the author shows how by the application of the researches of many investigators, himself being one of the pioneers, not only have the frightful ravages of beriberi been prevented, but affected persons have been restored to health by the simple expedient of changing one single article of food, namely the substitution of one commercial variety of rice for another. Full justice is given to the early work of EIJKMAN, VAN LEENT, VAN DIEREN, GRIJNS and others. In 1901 the author first definitely put forward the rice theory and later by practical experience carried it into successful operation. This preceded the valuable experimental work of SCHAUMANN, ARON, HOLST, FRASER and STANTON, and others. He states that "the intimate nature of the mechanism whereby the abstraction of the vitamine from the food entails beriberi is of the highest theoretical, but of less (at present) practical interest. For the hygienist in the tropics it is sufficient to have established the important fact that rice of a certain sort, or rice in a certain condition, *when used for the only purpose for which it ever is used* by the native, namely as a staple article of his diet, produces beriberi—it is therefore noxious to him, a poisonous food." A very large amount of detail is given, with statistical tables showing how in different places—prisons, asylums, hospitals, &c.—the case incidence and mortality have been prevented or enormously reduced by the dietetic methods alone. A survey of the statistics for the whole of the hospitals taken together shows that since the change of rice has become general, the total mortality has been reduced by two-thirds, from a mean average of 30 to 10 per cent. of those treated. As some 10,000 cases are treated every year this means a saving of 2,000 lives annually in British Malayan hospitals alone; yet even now every year it is estimated that 20,000 deaths take place from beriberi in the British Malayan area. In conclusion the author states that the cause of all this terrible sickness and mortality is a wholly needless and remediable error in diet, the remedy is also known and is everywhere applicable; let but this over-milling of the rice used by the natives be everywhere prevented, and the disease will be stamped out. At the conclusion of the meeting, Dr. Braddon brought forward a number of resolutions

which, after discussion and consideration, were finally passed in the following form:—

"1. In the opinion of the Tropical Diseases Section, beriberi amongst natives whose staple food is rice is induced by the continued and too exclusive consumption of the grain in a highly milled form, by which treatment the cortical and subcortical layers are completely removed.

"2. The Section urges upon all authorities responsible for the health of native communities the encouragement by every means in their power of the restriction of rice of this character for coolies.

"3. In view of the proved non-infectiousness of beriberi, this Section suggests to all port and sanitary authorities the propriety of abolishing quarantine and other restrictive measures at present in operation."

P. W. B.-S.

BRADDON (W. L.) & COOPER (E. A.). **The Influence of the Total Fuel-Value of Dietary upon the Quantity of Vitamine required to prevent Beriberi.** (Preliminary communication.)—*Brit. Med. Jl.* 1914. June 20. pp. 1348-1349.

The authors who are now carrying out feeding experiments with birds to throw more light on the deficiency theory of beriberi, point out that various experimenters have shown that the onset of beriberi symptoms depends not only on the deficiency of vitamins in the food but that the relative amount of these substances bears a definite proportion to the carbohydrate material. A bird receiving $\frac{1}{20}$ of its body weight of polished rice and $\frac{1}{2500}$ of dried yeast will develop polyneuritis in 39-95 days, if the quantity is increased to $\frac{1}{10}$ it falls ill in 22-46 days, that is, by doubling the carbohydrate ration, the onset of the disease is hastened in spite of the fact that there would also be a total, though small, increase of vitamins ingested with the rice. The results obtained demonstrate that the amount of anti-neuritic substance required increases with the amount of carbohydrate ingested. The explanation of this, suggested by FUNK, is that the active substance is required for carbohydrate metabolism; the more carbohydrate ingested the more vitamins will be necessary. Experiments by the authors showed that when chickens were fed daily with $\frac{1}{10}$ their body weight of polished rice and a small quantity of dried yeast, 93-98 per cent. of the starch was taken up, and the excreta were free from antineuritic substance; also that birds fed exclusively on glucose, which is rapidly absorbed, develop neuritis. These observations show that the anti-neuritic substance is utilized in some way during carbohydrate metabolism and that the destruction of the substance is not due to any physical factor. It is important in drawing up a dietary not only to regulate the absolute amount of anti-neuritic substance given, but also the proportion which this bears to the total calorific value of the diet, if we wish to prevent the onset of beriberi.

[The full paper, which is shortly to be published describing the experiments, will be read with interest.]

P. W. B.-S.

FUNK (Casimir) & DOUGLAS (Mackenzie). **Studies on Beriberi. viii. The Relationship of Beri-beri to Glands of Internal Secretion.**—*Jl. of Physiology.* 1914. Feb. 27. Vol. 47. No. 6. pp. 475-478.

A close relationship between food vitamins and the glands of

internal secretion is believed to exist by FUNK; he therefore thought that some histological evidence would be found in these glands in cases of deficiency disease. To demonstrate this a careful examination was made of eight pigeons which were suffering from the artificially induced disease, and the authors summarise the results found as follows:—"The glands examined showed a great diminution in size in every case. Microscopically there was a marked degenerative change of the cells with higher functions. In most cases the marked atrophy was due to a disappearance of the cells, the framework of the gland alone remaining. The most marked change was in the disappearance of the thymus."

P. W. B.-S.

FUNK (Casimir). i. Studien über Beriberi. x. Mitteilung Experimentelle Beweise gegen die toxische Theorie der Beriberi. [Studies on Beriberi. 10th Communication. Experimental Evidence against the Toxic Theory.]—*Hoppe-Seyler's Zeitschr. f. physiol. Chemie.* 1914. Feb. 28. Vol. 89. No. 5. pp. 373-377.

ii. Studien über Beriberi. xi. Mitteilung. Die Rolle der Vitamine beim Kohlenhydrat-Stoffwechsel. [The Rôle of Vitamines in Carbo-Hydrate Metabolism.]—*Ibid.* pp. 378-380.

i. The theory that beriberi is an intoxication disease has been largely brought forward in Germany. Last year ABDERHALDEN and LAMPÉ reported that pigeons fed on boiled rice developed beriberi much later than when fed on unboiled rice; this they thought was due to the process of boiling destroying some poisonous property in the rice. CASPARI and MOSZKOWSKI believed that a poison was formed in the body after ingestion of the rice. Three years ago COOPER and FUNK showed in their experiments that rice contained no poison and that starch, inuline, lactose, cane sugar and dextrine could produce typical beriberi in birds. The author carried out a first series of experiments on pigeons fed on boiled and unboiled rice, a second series using a synthetic dietary of casein, fat, starch, sugar, and salts in a mixture similar to that used by OSBORNE and MENDEL for their experiments on growth, and a third series to determine the vitamine content of beriberi pigeons. In this last experiment four healthy and four beriberi pigeons were finely minced up and their tissues extracted with alcohol in the cold. The results were very interesting, showing that the total supply of vitamines cannot be entirely removed in the diseased birds, but that the animal robs the vital organs of vitamines first, causing a fatal issue. The following conclusions are given:—

(1) Experimental beriberi develops in the same time with boiled and unboiled rice, provided equal amounts are given.

(2) A mixture of casein, fat, starch, sugar and salts produces beriberi. Commercial casein contains traces of vitamines, and if these are destroyed by boiling or removed by extracting with alcohol, the onset of beriberi is considerably hastened.

(3) Aleoholic extracts of beriberi pigeons can cure beriberi pigeons without producing any poisoning action. The animals get beriberi without entirely exhausting the supply of vitamines in the body.

ii. Funk has previously suggested that vitamines play an active part in the assimilation of food, as it was found that by increasing

the supply of food the onset of beriberi was hastened. The problem was to find out which constituent of food requires the vitamins for its assimilation. In human beriberi the disease arises particularly on carbohydrate dietary—rice, sago, white bread, etc. These known facts and the proof that pure carbohydrates could produce the disease suggested the idea that vitamins play an active part in carbohydrate metabolism. Pigeons were fed on polished rice, $\frac{1}{2}$, 5, 10 and 20 grams daily; those on the 20 grams first became ill, then those on 10, later those on 5; those that received only $\frac{1}{2}$ gram died of pure starvation, showing no sign of beriberi, thus demonstrating that in starvation little or no vitamins are consumed owing to the retardation of metabolism. A second experiment with artificially composed food showed that starch and sugar used up most vitamins. Four series of eight pigeons were placed on the following diets:—

		Salt.	Casein.	Sugar.	Fat.	Starch.
A	..	4	60	12	12	
B	..	4	12	12	60	12
C	..	4	12	12	12	60
D	..	4	12	60	12	12

Each pigeon received 12.5 grams of its mixture in a pill form. The onset of beriberi showed itself as follows:—

		A Casein. 30th.	B Fat. 40th.	C Starch. 24th.	D Sugar. 28th day.
Onset	..				

Conclusions. (1) Increasing amounts of foodstuffs rich in carbohydrates hasten the onset of beriberi.

(2) Addition of carbohydrates to a standard dietary and especially starch and sugar, hastens the onset of beriberi, which points to vitamins playing an active part in carbohydrate metabolism.

(3) The vitamins obviously play a more important rôle in starch metabolism than in that of the other constituents of the dietary.

P. W. B.-S.

GIBSON (R. B.). **The Influence of Compensated Salt Mixtures on the Development of Polyneuritis Gallinarum and Beriberi.**—*Philippine Jl. of Science.* Sect. B., Trop. Med. 1913. Oct. Vol. 8. No. 5. pp. 351-367. With 4 plates.

After an historical review of the deficiency theory of beriberi, and the determination of the essential factor missing, the author concludes that white rice with properly balanced mineral ingredients should prevent beriberi, provided the rice protein is nutritively adequate. After making a careful analysis of the rice, a salt mixture was prepared which, when added, brought the food up to that estimated as necessary in OSBORNE and MENDEL'S experiments. Fowls and monkeys were used for the experiments. Polyneuritis gallinarum was not prevented in the treated fowls, but the onset was slightly delayed and the degenerative changes in the nerves were less pronounced. Two fowls which received an excess of calcium and sodium lactate with the food did best; one actually gained weight during the first week, but it died on the 33rd day. The monkeys under treatment lost weight and developed neuritis equally with the controls.

P. W. B.-S.

SCHNYDER (K.). **Pathologisch-anatomische Untersuchungen bei experimenteller Beriberi. (Reispolynneuritis).**—*Arch. f. Verdauungs-Krankht.* 1914. Apr. 15. Vol. 20. No. 2. pp. 147-178.

This investigation was instituted to prove whether the anatomical changes found in animals with experimental beriberi were the same as those that have been shown to take place in human beriberi. A large number of mice (33), with 3 hens, 2 pigeons, 4 dogs and 2 cats were used, a neuritis producing food of varying character being given for considerable periods. In the mice the anatomical changes in the brain were not marked, the heart showed signs of dilatation and incompetency, the liver showed congestion and pigmentation with vacuoles containing glycogen; the most noticeable fact was the complete absence of fat from the liver. There were no changes in the cord and the sensory nerves showed no signs of organic degeneration. [These results thus differ from similar observations made by many other experimenters.] In the dogs degenerative changes were found in the nerves, but very rarely (2 out of 20) were like those found in human beriberi. The author states that he was very much surprised at the small amount of degenerative changes in the birds, which was in direct contradiction to that observed by FUNK; the same applied to the cats and all but the last dog, the reason probably being that death follows too soon after the first appearance of paretic symptoms for definite changes to develop in the nerves. In most cases the animals could be cured by administration of rice bran extract, showing that the paresis was not due to degenerative changes in the nerves. In conclusion the author states that etiologically and clinically the diseases of man and animals are identical, but pathologically the appearances are different. Further experiments are required to bring these observations more into line and he thinks it is necessary for the disease to be made to take as long a course in animals as it does in man, which might be brought about by providing a very small amount of vitamine in the food, enough to save life, but not to prevent the disease; a condition which probably naturally occurs in many natives living on rice.

P. W. B.-S.

GIBSON (R. B.). **The Protective Power of Normal Human Milk against Polyneuritis Gallinarum (Beriberi).**—*Philippine Jl. of Science.* Sect. B. Trop. Med. 1913. Dec. Vol. 8. No. 6. pp. 469-471.

Infantile beriberi, which is so common in the Philippines, has been considered by ANDREWS and others to be, in great part, due to a deficiency in the mother's milk of vitamins or protective substances against the disease. The experiments recorded in this paper were instituted by the author to prove whether human milk possessed any protective properties when given to fowls fed on polished rice. VEDDER and CLARK have shown that when 5 cc. of fresh cows' milk was added to the polished rice diet of fowls a partial protection was obtained, but that with canned milk there was little or none. For this experiment the human milk was taken from women in the obstetric ward of the Philippine General Hospital, three days or more after parturition. Eleven fowls were fed daily on 50 grams of polished rice, to which was

added 5 cc., 10 cc., or 20 cc. of the milk, a fourth group having only the rice; occasionally the proper amount of milk was not obtainable, but from the 27th to the 40th day there was plenty. The daily record is given in a table. This indicates that the addition of 5 or 10 cc. of milk to the polished rice did not prevent polyneuritis, and one fowl receiving 20 cc. showed on the fourth day mild, though typical, signs of neuritis. It appears, therefore, that human milk contains not more than one-fourth of the amount of vitamins found in fresh cows' milk. It is also pointed out that the histological examination of the nerves on about the twentieth day would be the most exact method of determining whether a bird was protected or not.

P. W.B.-S.

COOPER (E. A.). **On the Protective and Curative Properties of Certain Foodstuffs against Polyneuritis induced in Birds by a Diet of Polished Rice.**—*Jl. of Hygiene*. 1914. Apr. Vol. 14. No. 1. pp. 12-22.

This is a continuation of the author's studies on the causes, prevention, and cure of polyneuritis in pigeons. The present series were carried out to obtain information as to the relative efficacy of various foodstuffs for preventing beriberi, and to ascertain still further the distribution of the anti-neuritic substances in animal and vegetable tissues. His results are extremely interesting. The summary is here given in extenso.

"1. Pigeons fed on daily rations of polished rice equal to 1/20th their initial body-weight develop symptoms of polyneuritis in about three weeks and usually lose considerably in weight.

"2. The efficacies of various ox-tissues for preventing polyneuritis have been determined, and the tissues arranged according to their anti-neuritic powers are in the following descending order:—liver, cardiac-muscle, cerebrum, cerebellum, voluntary muscle, and (cows') milk.

"3. Alcoholic extracts of the excreta of a hen fed on unpolished grain and of the faeces of a rabbit fed on bread and cabbage cured polyneuritis in pigeons. The whole content of anti-neuritic substances present in the dietary was therefore not absorbed or else some amount is synthesised by the bacteria of which the faeces consisted to a considerable extent. No conclusions can consequently be drawn as to the actual distribution of the active substances in the animal body, until the extent to which the various tissues are absorbed from the alimentary canal of birds has been determined.

"4. Nuts (husked filberts) are very efficient in preventing polyneuritis, being even superior to lentils and husked barley. Cheddar cheese, on the other hand, even in considerable amount, has no preventive effect.

"5. Malt extract taken from two different samples readily cured polyneuritis in pigeons. A third sample, however, even in large doses had no curative action.

"6. For the prevention of beriberi egg-yolk, heart-muscle, liver, nuts, barley, and lentils can be recommended as suitable foodstuffs with which to supplement the polished rice diet. As meat (voluntary muscle) has been frequently found to be ineffective in preventing epidemics of beriberi, its replacement by heart and liver in mixed diets would be a considerable improvement, because, not only are these tissues when suitably prepared as nutritious as voluntary muscle, but they also contain the anti-neuritic substances in much higher concentration."

P. W.B.-S.

YELLOW FEVER.

LAFONT & CADET. *Paludisme et Fièvre jaune en Afrique Occidentale française. Etude de leurs Formules Leucocytaires et Comparaison avec celles de quelques autres Maladies.*—*Ann. d'Hyg. et Méd. Coloniales.* 1913. Oct.-Nov.-Dec. Vol. 16. No. 4. pp. 1068-1106.

An examination of ten cases of yellow fever in West Africa in 1912 has led the authors to compare the blood condition found with that of malaria. The blood findings in the ten cases of yellow fever have led the authors to the following conclusions:—

1. Malarial parasites were always absent.
2. The eosinophiles disappeared from the blood and if this disappearance persisted the case ended fatally.
3. The leucocyte formula was much changed and varied considerably. Sometimes there was a marked leucopenia, at others a hyperleucocytosis. It is difficult to judge to what extent these variations are due to treatment.
4. There seems to exist some relation between the extent of the leucopenia and the degree of albuminuria.
5. The large mononuclears are increased to 16, 19, 20, 23, and 28 per cent.
6. The leucocytes themselves seem altered in that they, especially the polymorphonuclears, have an acidophile protoplasm. The nuclei are often thick and swollen to such an extent that they may fill the entire cytoplasm.
7. The red blood corpuscles contain granulations which are either punctiform or elongate and often surrounded by an areola. As regards their nature it is impossible to state whether they are inclusions, cell alterations, small intracorpuseular parasites, or remains of malarial parasites.

With reference to the blood condition in malaria it is found that the hypoeosinophilia is absent while a leucocytosis is rarely observed at the commencement of a malarial attack. The leucocytes are not greatly altered in appearance. If malarial parasites are to produce an attack as severe as the onset of yellow fever then they will be numerous in the blood and easily recognised. Whether an attack of yellow fever will completely cover a previous malarial infection is a subject for future enquiry.

In variola there is also a fall in the number of eosinophiles which is more marked in grave and fatal cases. The hyperleucocytosis, however, is a feature more marked than in either malaria or yellow fever. In trypanosomiasis there is an increase of eosinophiles as well as mononuclears.

The authors point out that a study of yellow fever in Martinique by Noc led him to similar results as to the blood condition in this disease (see this *Bulletin*, Vol. 2, p. 21).

C. M. Wenyon.

FAJARDO (Diego Hernandez). *Un Caso de Fiebre Amarilla en un Nativo de Yucatán.* [A Case of Yellow Fever in a Native of Yucatan.]—*Revista Med. de Yucatan.* 1914. Jan. Vol. 9. No. 3. pp. 53-58.

The case recorded was in a native of Yucatan aged 10 years. The disease was of seven days' duration and in every way resembled a typical attack of yellow fever. Jaundice was marked, there was

vomiting of black haemorrhagic material and albuminuria (50 centigrams per litre) was present. Most careful examination of the blood failed to reveal malarial parasites, but this might have been due to the quinine injections which were given. The temperature which ran up to 39° C. fell to 36° before death. The pulse rate fluctuated between 90 and 100.

At the post mortem it was found that the liver was of a yellow colour, soft and friable. All the organs were yellowish and were considered to be in a condition of fatty change. The kidneys were hyperaemic and showed yellow patches of fatty degeneration. The stomach showed punctiform ecchymoses and areas of hyperaemia. The contents were of a haemorrhagic colour and contained in suspension fragments of mucosa. The intestine contained black material and showed a general haemorrhagic enterocolitis. The enlarged spleen had a normal colour. There was hyperaemia of the meninges and myocarditis due to a fatty degeneration in the myocardium. The pathological diagnosis was one of yellow fever.

The author states that in all the blood films there was present the parasite described by SEIDELIN under the name of *Paraplasma flavigenum*.

C. M. W.

GUITERAS (Juan). **Endemicity of Yellow Fever.** [Correspondence.]—*Yellow Fever Bureau Bull.* 1914. Apr. 7. Vol. 3. No. 2. pp. 110-113.

In his report on "vomiting sickness" in Jamaica SEIDELIN reported one fatal case in a Chinaman as being undoubtedly yellow fever (see this *Bulletin*, Vol. 3, p. 184). Guiteras now disputes the diagnosis of this case and points out various features which make it very improbable that the case was one of the disease. The absence of temperature, the pulse rate, lack of intense jaundice, together with the fact that the man was a Chinaman lead him to conclude that the diagnosis was incorrect. SEIDELIN replies that he is still convinced of his diagnosis (he found *Paraplasma* in the blood) though in some points the disease did not correspond to the classical type.

C. M. W.

Low (R. Bruce). **A Brief Account of the Incidence of Yellow Fever throughout the World during 1911-1912.**—*Forty-Second Ann. Report of the Local Govt. Board.* 1912-13. Supplement containing Report of Medical Officer for 1912-13. Appendix A. No. 3, pp. 148-170. With a Map. 1914. London: Printed under the Authority of H. M. Stationery Office. [Cd. 7181.]

This paper of 22 pages is full of interesting matter relating to the occurrence of yellow fever throughout the world not only in the years 1911 and 1912 but before that time. The information has been gathered from many sources and is presented in such concentrated form that it is impossible still further to condense it. After a general introduction the various states of South and Central America are considered in detail—Brazil, Venezuela, Chili, Peru, Ecuador, Columbia, Panama Canal Zone, Honduras, Mexico, West Indies. The occurrence of yellow fever in West Africa is treated under the headings—Senegal,

Gambia, Portuguese Guinea, Sierra Leone, Gold Coast, Togoland, Dahomey—in all of which cases of the disease have been reported during the period under review. The paper is well worth the attention of those interested in the spread and prevention of yellow fever.

C. M. W.

AGRAMONTE (Aristides). Observations upon a So-called Parasite of Yellow Fever.—*Trans. xvii Intern. Congress of Med.* London. 1913. Sect. xxi. *Trop. Med. & Hyg.* Pt. 2. pp. 71-81.

In this paper the author reiterates his disbelief in the parasitic nature of the bodies (Paraplasma) described from cases of yellow fever by SEIDELIN. The author points out that the role played by the *Stegomyia* mosquito in the transmission of the disease is perfectly familiar to him and, as SEIDELIN's bodies do not conform to what is already known as regards this or the period of infectivity in man, he cannot accept the bodies as the parasite of yellow fever. In the first place the bodies have been found in many conditions other than yellow fever though the author points out that SEIDELIN places himself in a unique and invulnerable position by declaring that some of these bodies shown him were not exactly like the ones in his preparations. Agramonte justly remarks, however, that there are no two things exactly alike upon the face of the earth, and in dealing with such extremely small objects artificially coloured a great similarity or a close resemblance should be accepted—all other conditions being equal—as evidence of identity.

In the second place the Seidelin bodies should not be able to pass a Berkefeld filter while the virus of yellow fever certainly does. It is pointed out also that in his early papers SEIDELIN reported having only found the bodies late in the disease and not in the early stages when the blood is infective. He assumed therefore that during the infective stage the parasites were invisible. In the later reports he claims to have found the parasite from the very beginning of the disease. The author also draws attention to the fact that SEIDELIN has found his bodies in many cases which have presented no signs of yellow fever and in his own blood he found them for a second time within two years and assumed that he had suffered from a second attack of yellow fever. The sanitary authorities, however, refused to recognise his case as one of the disease. In connection with the possible inoculation into guinea-pigs the author records having seen similar bodies in guinea-pigs treated with human blood.

C. M. W.

VILLEJEAN (A.). Fièvre jaune et " Vomiting Sickness " à la Jamaïque.—*Revue de Méd. et d'Hyg. Trop.* 1914. Vol. 11. No. 1. pp. 27-34.

This paper contains a review of the history of the vomiting sickness of Jamaica up to the time of SEIDELIN's investigations which failed to establish its supposed connection with yellow fever. The author then discusses the endemicity of yellow fever in various parts of the world. He thinks that the existence of the disease in benign form amongst the natives, particularly in children, explains the majority of facts connected with the persistence of the disease in endemic centres and the occurrence of outbreaks at more or less frequent intervals.

C. M. W.

BALFOUR (Andrew). **The Wild Monkey as a Reservoir of the Virus of Yellow Fever.**—*Lancet*. 1914. Apr. 25. pp. 1176-1178.

The author discovered amongst the natives of Trinidad a belief that an outbreak of yellow fever is preceded by some fatal epidemic amongst the red howler monkeys. In connection with a recent mysterious outbreak of the disease at Brighton in the south west of Trinidad it was found that the first cases occurred at a place where these monkeys are found and information was obtained that before the last great outbreak many of the monkeys died of the disease. As regards the recent epidemic there was no indication that monkeys had died before it broke out. (There was no possibility of the disease having been imported.) On enquiries instituted at Maracaibo (Venezuela) it was found that the most recent cases of yellow fever had occurred in Maracaibo itself while monkeys were only found 50 miles distant. Still the author thinks that the conditions in Trinidad are of such interest as to make it worth while to follow up the question of a possible monkey reservoir for the parasite of yellow fever.

C. M. W.

Low (George C.). **Monkeys as Reservoirs for the Virus of Yellow Fever.** [Correspondence.]—*Lancet*. 1914. May 9. pp. 1357-1358.

In this letter to the Editor it is pointed out that during an epidemic of yellow fever in St. Lucia in 1901 there was no indication that any animal host of the virus occurred. Similar investigations in Cuba and Barbados all lead to the same result, namely, that when once the disease is stamped out it does not recur until some chance importation of an infected individual or mosquito takes place. There is no evidence to indicate that the parasite, whatever it may be, survives in the blood of some animal host. In the West Indies the possibility of wild monkeys acting as reservoirs is very small indeed, as in most places—Barbados for instance—the monkeys where they occur are far away from the towns. The monkeys of Barbados are not red howling monkeys. In British Guiana where these monkeys are common cases of yellow fever are not met with amongst the non-immunes who traverse those areas.

Referring to the small epidemic mentioned in Dr. BALFOUR's paper as occurring at Brighton in Trinidad the writer cannot agree that all possibility of importation had been excluded. The first case was in a man who had arrived there from the Venezuelan mainland five days before being struck down. To the writer it appears clear that he acquired the infection in Venezuela or on the journey to Trinidad. As regards the sporadic cases of so-called yellow fever which crop up from time to time in endemic areas, it is doubtful if all these have been genuine cases of the disease since in many instances no necropsies were performed.

Referring to the bodies described from the blood of guinea-pigs and dogs by MACFIE and JOHNSTON [see below] the writer remarks that their discovery in monkeys would mean nothing as it has yet to be proved that they are parasites and, if so, that they are the cause of yellow fever. Recently the writer has examined the blood of guinea-

pigs in England in conjunction with WENYON and they have observed bodies very similar to those described by the two observers just mentioned.

C. M. W.

MACFIE (J. W. Scott) & JOHNSTON (J. E. L.). **Experiments and Observations on Yellow Fever.**—*Proc. Roy. Soc. Med.* 1914. Jan. Vol. 7. No. 3. Medical Section, pp. 49-67. With 5 figs. and 4 charts; and *Yellow Fever Bureau Bull.* 1914. Apr. 7. Vol. 3. No. 2. pp. 121-144. With 1 coloured plate and 7 charts.

These two papers are the same except that the second one is illustrated by a beautiful plate drawn by Miss M. RHODES showing the Paraplasma-like bodies from the blood of man, guinea-pigs, dogs and rats.

The papers open by stating that the experiments and observations were made at the Medical Research Institute, Yaba, near Lagos, Southern Nigeria, during the course of an epidemic of yellow fever at Lagos which commenced in May 1913 and was still in progress when the papers were written in September, 1913.

The authors point out that the cases of yellow fever in this epidemic fall chronologically into two groups, each of which was ushered in by a fatal case in a European. The first six cases occurred in May, the remaining seventeen in July and August. Up to September 1913, there had been four cases in Europeans, sixteen in natives and three in Syrians. Of the natives six were Kroo-boys. In the Europeans the disease presented all the classical symptoms and two of them died. Of the Syrians two died on the fifth day while the third case though not fatal was of a serious type. The symptoms in the natives were far from typical, but the authors point out that according to SEIDELIN this is the rule rather than the exception.

The Occurrence of Paraplasma-like Bodies in the Blood.—The authors have examined the blood from nineteen cases of yellow fever and have found the bodies in sixteen. In some cases they were very scarce, but in others they were by no means rare and were more common than malarial parasites are in adult natives suffering from mild attacks of malarial fever, in whom it is often extremely difficult to find conclusive evidence of infection. In one case, in a native, films were examined every day for twelve days and bodies were found on eleven of these days to be present in the blood. The bodies illustrated in the coloured plate resemble those in the plates accompanying SEIDELIN's original articles. As regards their appearance in the plate, they resemble some of the smaller forms of the piroplasmata (*Theileria*) or very minute malarial rings, being smaller than the ordinary rings of subtertian malaria.

Observations on Guinea-pigs.—THOMAS (1907) produced a reaction in guinea-pigs from four and a half to thirteen days after they had been bitten by infected *Stegomyia* and SEIDELIN observed bodies resembling *Paraplasma flavigenum* in two guinea-pigs inoculated by him from a case of yellow fever.

The authors experimenting with these animals inoculated 14 from 11 cases of yellow fever. In each case only one or two drops of human blood, diluted with 1 per cent. sodium citrate solution, were used for

subcutaneous injection. Ten of the animals showed a definite febrile reaction. Three guinea-pigs inoculated with normal human blood showed no reaction. Positive results have been obtained by inoculation made as late as the eighth day of the disease. The febrile reaction, detected by taking the temperature daily per rectum at 5 p.m., was definite and quite different from the oscillations seen in healthy animals. No other symptoms were noted in the animals, though three died suddenly on the 16th, 20th, and 38th day after inoculation. The latter animals all had congested livers and as only these animals died the authors feel justified in attributing their death to the inoculation of the yellow fever blood. All the guinea-pigs save one showed Paraplasma-like bodies in the blood, while no such bodies were found in uninoculated animals. One guinea-pig was subinoculated from another guinea-pig. It gave a well marked febrile reaction and showed the bodies in the blood.

Observations on Dogs.—Five puppies were inoculated. There was no febrile reaction, but bodies were found in the blood of four of them. Further in the blood of two of eleven stray dogs from Lagos paraplasma-like bodies were found. As a result the authors suggest the possibility of dogs being carriers of yellow fever.

Observations on Rats.—Two rats were inoculated from two cases of yellow fever. Paraplasma-like bodies were found in both. One showed some degree of fever after inoculation.

The examination of fowls as possible carriers of *Paraplasma flavigenum* gave only negative results.

SEIDELIN has examined the bodies found in man and animals by the authors and agrees that they are identical with his own *Paraplasma flavigenum*.
C. M. W.

VALLADARES (Prado). *Tratamento racional da Febre Amarella (Reflexoes e suggestoes)*. [The Rational Treatment of Yellow Fever (Reflections and Suggestions).]—*Brazil Medico*. 1914. Apr. 22. Vol. 28. No. 16. pp. 153–157.

The author puts forward the following suggestions for the treatment of yellow fever, based upon the clinical features of the disease.

1. During the first three days of the attack, while the virus is still circulating in the blood, recourse should be had to venesection combined with the injection of isotonic salt solution, and to lumbar puncture, in order to promote the circulation of antibodies. The usual derivative treatment may be practised in addition.
2. In the second stage the functions of the liver should be stimulated by the administration of alkalies, benzoate of soda and sulphuric ether. Enemata of cold water should also be given twice a day.
3. Adrenalin should be resorted to as soon as the fall in blood pressure shows that the functions of the suprarenal bodies are becoming impaired.
4. The renal-vein serum of TEISSIER should be employed to combat symptoms of anuria.
5. Bathing should be employed whenever the temperature rises above 39° C. in the absence of any indications to the contrary.

Attention is also called to a clinical symptom of very bad augury, already pointed out by Frederico KOCH, namely the occurrence of an ulcerating phlyctenule upon the cornea at the level of the external palpebral fissure, which distils a liquid like tears.
J. B. Nias.

LALOR (N. P. O'Gorman) & STEWART (D.D.). Report upon the Prevalence of *Stegomyia fasciata* at the Principal Seaports and Seaport Towns in Burma.—viii + 41 pp. 1913. Rangoon: Office of the Superintendent Government Printing, Burma.

In the introduction to this Report the nature of yellow fever and its transmission, the bionomics of *S. fasciata*, how to recognise it, and the principles of its destruction are clearly set forth. The larvae were found breeding at Rangoon, Moulmein, Akyab and Bassein—in diminishing sequence. They were not found in wells, ponds, unpaved drains or creeks. Stewart notes that he has never found any in stagnant water collections of extreme foulness and that rain-water casks tarred in the interior are usually avoided. The fact that at Rangoon 286 premises were inspected, and a few breeding sites were found in nearly every house, is an index of the prevalence of this mosquito. At Bassein they were present in about 60 per cent. of 387 houses inspected. The following table gives the most frequent breeding sites noted in this survey.

Nature of breeding place.	Absolute numerical frequency.	Frequency expressed as a percentage.
1. Stale water in earthen chatties ..	675	49.2
2. Stale water in barrels and casks ..	145	10.5
3. Stale water in wooden tubs ..	137	9.9
4. Stale water in flowerpots and vases ..	117	8.5
5. Stale water in { old tins, various 58 old paint tins 25 old kerosene tins 21 }	104	7.55
6. Stale water in small gumlahs under legs of meat-safes and cupboards ..	92	6.7

Thus the commonest breeding sites in mills and godowns are barrels, casks, fire buckets and earthen chatties; the commonest sites in European bungalows are water barrels and gumlahs under the legs of meat safes and cupboards; and flower-pots, vases, barrels and Pegu jars in Burmese houses. It is advised that receptacles for water should be emptied once or twice a week, or in the case of larger vessels made mosquito-proof.

A table shows the results of larvicidal experiments. The most successful larvicides were cyllin and Gorgas's larvicide with phenyle instead of carbolic acid, these in strength 1 : 1250; coal tar and turpentine emulsified in equal parts with soft soap, and a mixture of coal tar, petrol, soft soap and water; these in 1 : 2500 strength. The authors write:—

"All things considered, larvicide, composed of coal tar one pint, turpentine one pint, soft soap one ounce, made up to two gallons by the addition of water, is calculated to yield the best results.

"This larvicide after being well shaken should be added to water collections containing larvae in the proportion of one ounce (two tablespoonfuls) per gallon. *Stegomyia* larvae in twenty-five gallons of water can be destroyed with the larvicide in this proportion in five minutes, at an outside cost of one anna. The larvicide at current market prices costs about six annas a gallon."

Destruction of the insects by fumigation is best accomplished with sulphur dioxide gas or burning pyrethrum. The sulphur should be

burnt in a tin or other shallow vessel, placed not in water but on dry sand in a shallow open box, some two feet square in superficial area. For its insecticidal effects the gas should be kept dry. Formaldehyde gas is useless.

Appendices contain details of the streets and receptacles in which larvae were found breeding in the four towns. There are illustrations of the *Stegomyia* and its breeding places and five maps on which the results of the survey are charted.

A. G. B.

MISCELLANEOUS.

GRANULOMA PUDENDI.

WISE (K. S.). *Granuloma Pudendi and its Parasite.*—*British Guiana Medical Annual* for 1912. pp. 54-64.

A description of the disease is first given. Geographically the condition has been found in British Guiana, West Africa, India, South China and Australia; it is occasionally met with in Ceylon, Malaya and Central Africa. The attention of the medical profession of British Guiana was first drawn to it by NEAL and OZZARD in 1892. CONYERS and DANIELS later (*British Guiana Medical Annual*, Vol. 8, 1896) gave a very good clinical description of the malady and definitely differentiated it from syphilis, malignant diseases and tubercle. As regards its etiology Wise in 1906 discovered spirochaetes in the lesions. Subsequently at intervals since that year he has examined 62 specimens of granuloma pudendi both by smears and by section. Numerous stains were used and certain curious bodies were found. The author refers to these as follows:—

“There are also present masses of small bodies which seem to represent some phase in the life history of a protozoal organism. Stained by either Leishman's or Giemsa's stain a thin capsule is apparent surrounding a clear unstained space; in the middle of the space is a chromatin staining curved rod, thin in the middle and thicker club-shaped at each end. These bodies appear massed together in numbers varying from 2 to 25, and are often found within the leucocytic cells present.”

Since that time the same or similar bodies have been seen by DONOVAN and CARTER in India and by CLELAND, STRANGMAN and STEELE in Australia. In the latter part of 1912 the author adopted the jelly intra-vitam staining method of examination and thus threw a considerable amount of light upon the nature of these protozoa-like structures.

“If a film from Granuloma Pudendi be made by this method, the cells, at first pale and colourless, gradually take up the stain (Polychrome Methylene Blue) and develop their characteristics in the course of observation. The polymorphonuclear cells, mononuclear cells, and plasma cells all appear gradually, the nuclei as a pale greenish blue and the protoplasm as a finely spotted dull red colour. Here and there are noticed small deeper bronze coloured bodies which vary in size from 2/1,000 mm. to 8/1,000 mm. Careful observation reveals in the smallest of these bodies one or two nuclear points which later become 4, 8, or 12 nuclear points; finally, in the larger bodies 12 to 20 nuclear masses are readily detected. If watched further, the protoplasm will be seen to divide around these nuclear points and form a number of spores.

“These spores when massed in this way are very noticeable and readily seen. They are sometimes present in hundreds all over the specimens. They are very beautiful objects, in some ways resembling the rosettes of malarial parasites (the pigment of course being absent). The size of each spore is about 2/1,000 mm., they are bronze coloured, slightly pear-shaped, being pointed towards the centre of the rosette and arranged regularly around the centre. Probably the real position of these sporulating bodies is within mononuclear cells, but in the scraping during preparation for observation, many of the sporulating bodies are forced outside the cells and broken, so that scattered fours, eights and twelves of these spores may be found extra-cellularly situated. It is easy to find six or seven of these sporulating rosettes in a single bloated, tensely-filled mononuclear cell. The further stages of existence as noted under the microscope show that

the spores remain in the rosette formation, but finally the cell bursts, or some surrounding invisible envelope bursts, and the spores are shot out into the surrounding plasma."

From these observations then it would appear that the protozoa-like bodies seen in dried stained films are really dead distorted remains of a rosette-like protozoal sporulation, the bodies seen in stained smears being really distorted spores of the asexual cycle of a protozoal parasite. The author does not explain the nature and exact zoological position of the parasite but hopes to do so at some later date.

G. C. Low.

ARAGAO (Henrique de Beaurepaire) & VIANNA (Gaspar). **Untersuchungen ueber das Granuloma venereum.**—*Memorias do Instituto Oswaldo Cruz*. 1913. Vol. 5. No. 2. pp. 211-238. With 7 plates.

A somewhat lengthy account of the subject of Granuloma pudendi. The disease appears to be common in Brazil and clinical material was easily obtained. Wassermann's reaction was negative, this confirming the well-known view of the non-syphilitic nature of the disease. The work of WISE and other authorities on the spirochaetes and protozoa-like bodies that have been found in the lesions is mentioned in detail. According to the authors FLU has cultivated a germ from granuloma, but their researches do not confirm this work. In three out of eight of their cases they also isolated an organism but not the same as that described by FLU. Their bacterium is a facultative aerobe and grows best at 37°C. It produces fermentation but neither indol nor sulphuretted hydrogen. Acid production takes place in the cultures in the first days, then diminishes, and finally remains constant. The organism lives well on artificial media even up to the end of six months.

[WISE's paper above clearly shows that the organism is a protozoon, not a bacterium. It looks therefore as if the authors had only cultivated some secondary contaminator.]

For treatment the authors advise intravenous injections of tartar emetic. In one case 21 of these injections were given as follows:—1st day 0.05 gm., 2nd 0.08 gm., 3rd to 13th 0.1 gm., 14th to 17th 0.08 gm., 18th to 21st 0.1 gm. or a total of about 1.8 grammes.

In another case, a woman, ten injections were given within a period of thirty days. Rapid healing of the lesions took place in both these as in other cases, the results being permanent.

[If suitably confirmed this is a great advance in the therapy of this disease. Up to the present the condition has stubbornly resisted all medical treatment, the only chance of preventing its spread being to detect it early and to excise it completely by surgical methods.]

G. C. L.

TERRA (F.) & RABELLO (Ed.). **Le Granulome ulcéreux et sa Cure.**—*Bol. Soc. Brasileira de Dermatologia*. 1913. Vol. 2. No. 1. pp. 3-12.

The authors describe the condition as consisting of a chronic disease characterised by ulcerative, vegetative or granulomatous lesions, with dense cicatrisations and localised to the organs of generation. The work accomplished in British Guiana by various workers is referred to [see paper above by WISE]. They found, as others, that the disease is

not syphilitic, Wassermann's reaction being negative and anti-syphilitic treatment of no use. The protozoal organisms described by WISE and others are also discussed. From two cases observed by the authors a sporotrichum resembling the sporotrichum of SCHENK was found and this led them to the belief that the disease might be a species of sporotrichosis.

For treatment the method of ARAGAO and VIANNA [see above] was adopted. This consisted of intravenous injections of a solution of tartar emetic, dissolved in physiological serum, which were given, one every day at first and then one on alternate days; after a few injections the ulcers began to show signs of healing and, according to the authors, completely disappeared after the fifteenth injection. They believe therefore that tartar emetic is a specific for this disease.

G. C. L.

CLIMATIC BUBO.

CHASTANG (L.). **Quelques Remarques au Sujet de la Nature et de l'Origine du Bubon Climatique.**—*Caducée*. 1914. May 2. Vol. 14. No. 9. pp. 118-119.

The author mentions some of the different hypotheses which have from time to time been brought forward to explain the nature of the disease. LEGRY and NATTAN-LARRIER, for example, believe that the condition may be a sporotrichosis. ROST's view [see this *Bulletin* Vol. 1, p. 474] is also given; the fact that the disease is not found in children nor in continent adults certainly strengthens his idea of its venereal nature. The author, from considerable experience of the disease, confirms the fact that the condition is only met with in the male sex and quotes GREY's figures for Pekin, where out of 37 observations, the disease always occurred in men. The author pertinently points out that if one admits a venereal etiology for the complaint females should suffer as well as males. As a possible cause he suggests that intertrigo, which is common in men who have to make fatiguing marches, may have something to do with the etiology.

G. C. L.

BARLOW (N.). **Epidemic Climatic Bubo.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914. May. Vol. 1. No. 11. pp. 787-788.

Apparently carried by some biting insect an epidemic form of climatic bubo has recently occurred in certain localities near Cuyamel, Honduras. The disease sets in rather sharply with pains in the limbs and back, headache, anorexia, rarely nausea and vomiting, irregular fever and painful swelling in and around a single gland with redness of the superadjacent skin.

In one instance was more than one gland involved and except in cases of secondary infection suppuration was not noticed. The condition is usually met with in one of the inguinal or axillary glands, but any gland of the body may be affected.

According to the author salicylates in large amounts, 40 grains or more daily, are specific. If treatment is begun early on the first or second day the patient may be at work again in three days. Counter irritation should not be employed.

G. C. L.

RAT BITE DISEASE.

SCHOTTMÜLLER (H.). **Zur Aetiologie und Klinik der Bisskrankheit. (Ratten-Katzen-Eichhörnchen-Bisskrankheit).** [The Etiology and Clinical Aspects of Diseases due to Bites (Rat, Cat and Squirrel-Bite Diseases).] *Dermatol. Wochenschr.* 1914. Ergänzungsheft zu Band 58 (Festschrift). pp. 77-103. With 4 figs. and 2 curves in text, and 2 coloured plates.

Reference is first made to the fact that the bites of other animals in addition to rats (cats, weasels and squirrels) may give rise to the disease. MIYAKE'S work is then detailed as is also OGATA'S discovery of a supposed protozoon in the blood. [For this see this *Bulletin* Vol. 1, pp. 407-409.]

PRÖSCHER, it is stated, has not confirmed the latter observation. The author then describes in detail two cases of the disease—one that of a laboratory attendant bitten on the thumb by a rat, the other that of a woman bitten on the forefinger and thumb of the right hand by an African squirrel (*Taraxerus cepapi*). Amongst the clinical symptoms which developed in this case were little nodules in one eye, these finally extending and completely destroying the sight of that organ. Since then the latter animal, which is now confined in HAGENBECK'S Zoological Gardens, has bitten another man, but so far nothing has happened.

In smears of pus made from the lesions of the second case the author found numerous rod-shaped structures about the length of a tubercle bacillus. These on being cultivated took the appearance of a streptothrix, long thread-like forms developing. He proposes to name this organism the *Streptothrix taraxeri cepapi*. Some experimental inoculations were made on monkeys with positive results, one, for example, developing similar eye lesions (panophthalmitis) to the woman, but nothing happened in rabbits and guinea-pigs. Microphotographs of the streptothrix are given and two coloured plates show the skin and eye lesions in the human subject very well.

G. C. L.

DALAL (A. K.) **Case of Rat-Bite Fever, treated with Intravenous Injection of Neo-Salvarsan.**—*Practitioner.* 1914. Mar. Vol. 92. No. 3. (No. 549). p. 449.

The history of the case was as follows:—The patient was bitten on the inner side of her right ankle by a rat eighteen days before being seen. There was some slight hæmorrhage at the time but on the fifth day the wound had healed, leaving a small white scar. On the tenth day there was some swelling round the scar. On examination the author found that in addition to the swelling there was pain along the lymphatics with enlargement of the popliteal and femoral glands. Weight could not be borne on the leg nor could the patient fully extend the knee and hip joints. '9 grm. of neosalvarsan was injected intravenously. After a week the enlargement of the glands and the pain along the lymphatics, as well as the fever, disappeared completely. A month later the patient was seen again and during that time there had been no recurrence of the disease.

It is stated that rat bite disease, though rare in Europe, is common in India.

G. C. L.

LAGRIFFE & LOUP. **Un Cas de Sokodu.**—*Presse Méd.* 1914. Apr. 18. No. 31. pp. 456-458.

A case of rat bite disease is described, the patient, a woman, having been bitten on the finger by a rat. Some time after an eruption appeared on the face and body, this being followed by the usual signs of the disease. The authors state that though their observations were incomplete their case presented features of interest. The cases reported by HORDER and FRUGONI are referred to [see this *Bulletin* Vol. 1, p. 409] and OGATA and SHIKAMI's work is also mentioned.

G. C. L.

ENTOMOLOGICAL PAPERS.

DOANE (R. W.). **Disease-Bearing Insects in Samoa.**—*Bull. Entomol. Research.* 1914. Feb. Vol. 4. Pt. 4. pp. 265-269. With 3 plates.

The author stayed for a short time during the summer of 1913 on the island of Upolu, German Samoa, and made a few observations on mosquitoes and flies. *S. fasciata*, *S. pseudoscutellaris* and *Culex fatigans* are all numerous. *S. fasciata* is troublesome in the house all day. Most relief can be had by capturing them with an insect net. All the cisterns were screened and tin cans and broken bottles round the house were emptied, but these mosquitoes still abounded. He found that they were breeding in the roof gutter over his window and in the concave bases of upturned bottles, which bordered a walk and were overgrown by vegetation. Larvae were numerous also in the hollow of an old bread fruit tree which branched close to the ground. He points out the danger of the introduction of yellow fever when the Panama Canal is opened.

When twilight comes *S. fasciata* retires and *Culex fatigans* appears. Physicians in these islands believe that more than 50 per cent. of the Samoans become infected with *Filaria bancrofti* by being bitten by this mosquito. It transmits also the organism of dengue fever, frequent among the Samoans. *C. fatigans* breeds with *S. fasciata* near dwellings, and also much farther away with *S. pseudoscutellaris*.

S. pseudoscutellaris is very common about the house and bites during the day. It is often found breeding in the cup formed when a papay tree is cut down; it is not definitely known to transmit any disease. Another mosquito found in Samoa is *Finlaya kochi* Dönitz. Bites which caused much irritation and also small sores were believed to be due to this mosquito.

Musca domestica occurs in extraordinary numbers in Samoa. It is suggested that flies convey typhoid and yaws. Another dreaded disease carried by flies is Samoan conjunctivitis. Flies swarm round the eyes of children suffering from this disease. Blindness of one or both eyes is commonly caused by it.

The examination of a single rat caught in a store resulted in the capture of a number of *Xenopsylla cheopis*, the Indian plague flea. The dogs were badly infested with *Rhipicephalus sanguineus*, which transmits malignant jaundice in South Africa and India.

The author points out that on some of the Samoan islands these insect pests can be controlled with a reasonable amount of intelligently directed effort.

A. G. B.

ECHVERRIA (Emilio). **Innocuous Bites of Malaria and Yellow Fever Mosquitoes during the Daytime.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914. Mar. Vol. 1. No. 9. pp. 625-626.

The author refers to Central and South American experience that persons who work in malaria and yellow fever districts may avoid these diseases by spending the nights on higher ground. He asks how it is that a non-immune person may be bitten with impunity by yellow fever carriers, even in a well-marked epidemic of the disease, as long as this happens in the day time. The explanation he offers is that the female mosquito bites as soon as possible after emergence from the pupa, when she is of necessity harmless, but that afterwards she takes to the nocturnal habits which are natural to her. The prophylaxis of these diseases is therefore comprised in the words "avoid being bitten by a night mosquito."

A. G. B.

MACFIE (J. W. Scott). **A Note on the Action of Common Salt on the Larvae of *Stegomyia fasciata*.**—*Bull. Entomol. Research.* 1914. Feb. Vol. 4. Pt. 4. pp. 339-344. With 1 plate.

GRAHAM found that the suspended matter in water in which the larvae of *Pyretophorus costalis* were breeding could be precipitated by the addition of 3 per cent. of common salt and that then the larvae fed on one another. He considered that this phenomenon was due to the larvae being deprived of their natural food, the algae, which had been destroyed by the addition of salt. The author's experiments were undertaken to determine to what extent the action of the salt on mosquito larvae was due to the destruction of the natural food supply and to what extent to the hypertonic nature of the solution. The larvae were those of *S. fasciata*. Samples of water were obtained from the water-pots and domestic utensils in the native quarters at Lagos and an analysis was made of the amount of salt present. The average of six determinations was 0.012 per cent. NaCl. This percentage is therefore assumed to be that in which the larvae thrive best. Experiments were then made with solutions of 0.5 per cent. of NaCl and upwards and then with more dilute solutions.

"The experiments would seem to prove that, in solutions of 2 per cent. and upwards, the action of common salt on the larvae of *Stegomyia fasciata* is due to the hypertonicity of the solution. In more dilute solutions the destruction of the natural food supply of the larvae may have some influence. Alum, however, which clarifies water more efficiently than common salt, has no peculiar action on the larvae.

"In Lagos the larvae of *Stegomyia fasciata* are found most abundantly in water contained in domestic utensils, and in the large pots in which the natives store up water for drinking and cooking. It would be of great advantage if common salt could be used as a larvicide in these cases. . . . From the experiments described, it would appear that sufficient salt would have to be added to each vessel to bring the concentration of the solution up to 2 per cent. NaCl in order to ensure the destruction of the larvae."

Some experiments were done to determine to what extent mosquito larvae were capable of surviving in temporary pools, such as those beneath the taps of tanks and the open ends of drains into which

larvae are apt to be swept. These were not very conclusive. The author thinks it would be a wise precaution to treat these places with larvicides.

A. G. B.

SIMPSON (J. J.). **Entomological Research in British West Africa. V. Gold Coast.**—*Bull. Entomol. Research*. 1914. Apr. Vol. 5. Pt. 1. pp. 1-36. With 4 plates and a map.

This is the last of a series of papers dealing with entomological research in the British Possessions in West Africa. The author points out that this report must be taken in conjunction with the previous four. His observations were made during a tour in the Gold Coast from November 1912 to June 1913. An account is given of the geography of the Gold Coast. The Volta is by far the most important river and connects the French Sudan, the French Ivory Coast, Togoland, the Northern Territories and Ashanti with the Gold Coast Colony. The vegetation and the climate and rainfall are dealt with, with meteorological tables. It is stated that the Gold Coast is the colony of least rainfall in West Africa.

Sixteen pages are occupied by the narrative of the author's journeys, which contains much information of local value. At the capital, Accra, both *G. palpalis* and *G. longipalpis* have been captured within the last few years. The author says that both are introduced from the surrounding country by trains and motor wagons from distances five to twelve miles from Accra. At Yeji, one of the largest ferries on the Volta River, *G. morsitans*, *G. palpalis* and *G. tachinoides* were found. In 1912 over 50,000 natives crossed at this point and 23,000 animals. Simpson points out that the ferry is a good source of revenue and part might with advantage be devoted to clearing the banks of the river. At Kintampo, in Ashanti, he states that recent extensive clearing has caused an enormous reduction in the numbers of tsetse flies, five species of which occur. In a journey from Seccondi to Accra by way of the coast the author found that the predominant tsetse fly was *G. longipalpis*, *G. palpalis* being found at mouths of rivers. Mosquitoes, including *S. fasciata*, were extremely troublesome, breeding in casks, old canoes and other receptacles used for tanning nets.

A list is given of the blood-sucking insects and other arthropods recorded from the Gold Coast. Notes are given on malaria, yellow fever, sleeping sickness, plague, trypanosomiasis of stock, and spirochaetosis. It is noted that *Stegomyia fasciata* is most common along the coast. Of the cattle brought from the north and slaughtered in Coomassie about 80 per cent. harboured trypanosomes. Notes are given on the distribution of the ten species of *Glossina* found in the Gold Coast. The Colony is compared with Southern Nigeria, the Northern Territories with the northern part of Northern Nigeria. There are four species of the *palpalis* group, *G. palpalis* itself being closely associated with all the river systems; *G. tachinoides* is the predominant species in the Northern Territories. There are two species of the *morsitans* group, *G. longipalpis* being found in the denser part of the savannah forest, *G. morsitans* in the more open and drier country. There are three species of the *fusca* group, and one of the *brevipalpis* group. The author is strongly inclined to think that there

is a closer connection between the prevalence of game and *G. morsitans* than of any other species. A list is given of the parasites of game and other animals found.

Photographs show the character of the vegetation and a map the distribution of sleeping sickness and tsetse flies and the various types of vegetation. The records of tsetse flies correspond for the most part with the author's routes.

A. G. B.

SCHÜFFNER (W.) & SWELLENGREBEL (N. H.). *Stegomyien van Deli*. [The *Stegomyias* of Deli.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1914. Vol. 54. Pt. 2. pp. 204-205. With 1 plate.

A note on the species of *Stegomyia* met with at Deli, Sumatra. *S. fasciata* was first observed and described in 1908 by Mr. and Mrs. van LOGHEM-PAUW, and since then *S. scutellaris* and *S. pipersalata* have also been recognised. The two latter do not seem to be capable of conveying yellow fever. An illustration is given of the distinguishing points of the three species. *S. pipersalata* has only been found once, whilst *fasciata* seems to be less common than it was a few years back. *Scutellaris*, on the other hand, is becoming the common house-mosquito in many parts of the district.

J. B. Nias.

BOOK REVIEW.

Regarding the review of our book* on p. 52 of Vol. 4 of this *Bulletin*, issued on June 30, 1914, there are certain statements therein, which, as they tend to misrepresentation, need to be pointed out. The book deals, as our reviewer acknowledges, with the life histories of certain parasitic Protozoa. Colonel Alcock, our reviewer, is well known for his work on Indian marine biology and more recently as a worker on entomology, but surely in these days of specialisation he can hardly expect also to be regarded as a protozoologist. Naturally, then, in the review, there is little stated as to the merits of the book as a work dealing with protozoology.

The notice of the book has been made detractory by the unfortunate use of the method of partial quotation, certain excerpts being given apart from their context and depreciatory inferences drawn or suggested therefrom.

To take the partial quotations and certain other lapses and give them shortly in their actual setting as they appear in the book itself:—

What the Reviewer writes :

(a) 'The tsetse fly is represented as "dropping maggots which rapidly become very like the foetid surroundings in which they live."'

[The quotation is not strictly accurate.]

What occurs in the book :

(a) p. 23. "Lurking under rotting leaves, among banana roots, and in the soft shaded soil near the streams, the parent tsetse flies drop small maggots, or larvae, which rapidly become very like the foetid surroundings in which they live."

p. 31. "The tsetse fly does not lay eggs, but within her body a yellowish footless maggot develops. When this is passed from the body of the parent it creeps into the soil and becomes dark in colour."

* Fantham (H.B.) [D.Sc.Lond., B.A.Cantab.] & Porter (Annie) [D.Sc.Lond.] *Some Minute Animal Parasites or Unseen Foes in the Animal World*.—1914. London: Methuen & Co., Ltd. [Price 5/- net.]

(b) 'The spread of *Glossina* from Africa to India in "certain kinds of vegetable cargo."

(b) p. 36. "The Indian authorities exercise great care in preventing infected persons from landing and in scrutinising certain kinds of vegetable cargo for possible pupae of *Glossina palpalis*."

(c) 'The development of Southern India (of all places on this dull terrestrial ball) is represented as having been retarded by the destructive effects of Protozoa upon transport animals.'

(c) p. 45. "In South India railway development has been retarded to a great extent by the difficulty of transport of materials. Horses and other baggage animals are victims of a trypanosomiasis for which the native name is 'surra.'"

This is an example of a bad lapse by the reviewer from the original statement, which concerns railway development and specifically mentions "surra." Colonel Alcock's opinions on Southern India apparently do not agree with those of the Government, which, according to the press, has just floated a loan for such railway development.

(d) 'The airy vision [*sic*] that sees Protozoa at the bottom of all [*sic*] the extinction revealed by the geological record is mentioned with respect and half approval.'

(d) p. 300. "One recent suggestion is that the disappearance of these mammoth creatures from the earth's surface was due to the activity of malarial parasites, trypanosomes, or other parasitic Protozoa."

In this connection we need only mention the works of Sir Ray Lankester and Mr. W. H. S. Jones.

(e) 'The spirochaetes are given substantive rank in the Animal Kingdom.'

(e) The Spirochaetes are discussed in Chapter IV, entitled "The Spirochaetes: Border-line organisms between plants and animals." p. 87. "We think that the balance of evidence is somewhat in favour of the inclusion of the spirochaetes among the protozoa and of the adoption of the new class, Spirochaetacea, which was first set forth in 1907."

[This is not stated in the book at all.]

(f) 'The unknown virus of yellow fever is dealt with in the body of the book, instead of in an appendix.'

(f) p. 165. "Dr. Seidelin, working at Merida in Yucatan four years ago, found certain bodies in the blood of yellow fever patients. He believes these to be Protozoa responsible for the disease. Other workers have not found these bodies in yellow fever patients on the one hand, or on the other they have found similar bodies in cases of other complaints. More work is necessary before the exact nature of the agent of disease is determined, and some is now in progress in Africa."

In addition to the foregoing, there are also inaccuracies and deficiencies in the statements regarding the contents of the chapters, e.g., "Grouse-disease," "Bee- and Silkworm-diseases." Grouse, bees and silkworms alike suffer from more than one disease. Those discussed in the book are coccidiosis and microsporidiosis, terms quite familiar to the public inter-

ested in poultry-keeping and game-preserving, and in bee-keeping respectively. *Herpetomonas*, *Crithidia* and *Rhinosporidium* among others are also described in the book, but mention of them in the review is omitted.

Lastly, with regard to the alleged dramatic method, apparently so repugnant to the reviewer, we leave the accuracy of his statements in the hands of the reader. As in the opinion of our critic "the mode of treatment" in the book "is eminently practical" and at the same time "undoubtedly is suggestive and stimulating," we hope that it may still be of service to those for whose information it was written.

H. B. Fantham.

A. Porter.

I do not consider that the review is either detractive in its general tone or unfair in any specific line of argument.

To reply to the objections in their order:—

(a) The gravamen of the criticism lies in the powerful and misleading adjective "foetid," which is not modified by the subsequent statement on p. 31.

(b) I regret that I did not state explicitly that the allusion is to the pupae of *Glossina palpalis*. The allusion to *Glossina* was, naturally enough, detached from its context (namely the allusion to infected persons), because until it has been proved conclusively that the trypanosomes in question cannot be transmitted by other biting insects besides *Glossina*, the surveillance of infected persons is a preventive measure that is quite above criticism. I still consider that the scrutiny of any kind of vegetable cargo imported into India from Africa in the expectation of finding living pupae of any species of *Glossina* therein is, for several reasons, a proceeding that is not entitled to very respectful consideration.

(c) Though I might, perhaps, have made it clear that the authors referred particularly to railway development and to surra, I cannot concede that the argument is affected by the omissions. Quite apart from the interdependence of the two lines of development, it can be affirmed (1) that surra is no more embarrassing to South India than it is to other parts of the Indian Empire; and (2) that financial and strategic considerations having, up to quite recent years, been the main determining factors, Southern India has lagged in the matter of railway construction because it is that part of the Indian dominions that is most remote from the historically-vulnerable frontiers.

(d) I admit that I have indulged in hyperbole in my reference to a speculation which—however much its specific applications be limited—lies outside the boundaries of exact knowledge: but I think that my words make it clear that I did not attribute this speculation to the authors.

(e & f) The essence of my argument is that in the main substance and fabric of a book expressly limited in its title to animal parasites and the animal world, certain things whose exact position in the Cosmos is debated are incorporated. I approached the subject—and I still regard it—as a question of unity and a matter of taste.

A. Alcock.

Colonel Alcock naturally does not deal with the question of his competency to review a work dealing with the life history of parasitic Protozoa, raised in the first paragraph of the authors' statement. To this it may be replied that Colonel Alcock was for thirteen years Professor of Zoology in the Medical College of Bengal, and that the sub-title of the book would seem to indicate that it is not intended only for specialists, as indeed may be gathered from the preface.

Editor.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES
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APPLIED HYGIENE IN THE TROPICS.

By COLONEL W. G. KING, C.I.E., I.M.S. (Retired).

REPORTS.

SANITARY COMMISSIONER WITH THE GOVERNMENT OF MADRAS.

The rainfall for the year was below the normal. The prices of the staple grains increased from 22 to 26·5 per cent. above the average. Using the census figures of 1911, the total estimated population of 1912 was 42,437,798. Allowing for excess of births over deaths, registration figures almost coincided with this calculation. Nevertheless, the Sanitary Commissioner points to several areas where registration has been inefficiently conducted, and urge the reorganization of the registration agency. In this connection he advises the extension of what is known locally as the "Trial Scheme," where, in rural areas, compulsory registration of births and deaths is part of the vaccination scheme, as likely to lead to improved results. Per mille of the population, the total registered birth-rate was 30·4, the total death-rate 23·1. Death-rates for special diseases were, per mille—cholera 1·4, plague 0·4 (against 1·1 for several years), "fever" (unclassified) 7·4, diarrhoea and dysentery 1·6. Injuries claimed 0·3 per mille, of which suicides were accounted for in the proportion of 111 females to 100 males—a peculiarity of statistics having a probable relation to caste and social problems of Hindus.

The Sanitary Commissioner had reason, in his Report of 1911, to invite certain Municipalities to use more diligence as to conservancy, and to cease their attempts to divert the energies of their Sanitary Inspectors from their legitimate duties to those connected with general administration. He, however, in the present Report, is able to give a more favourable account of these matters.

*Report of the Sanitary Commissioner with the Government of Madras (1912).—1914, Madras. Printed by the Superintendent, Government Press.

Fourteen District Municipalities and the Madras City conduct sewage farming by broad irrigation. Five of these farms were worked at a profit. The crops grown are English and country vegetables, grasses, tobacco, plantains (bananas), sugar-cane, and coconut trees. Bacterial filters, or septic tanks, are used before disposal on land in four Municipalities. Rubbish after stacking, and night-soil after trenching, obtain a sale in 18 Municipalities. Four Municipalities let their trenching grounds, after completion, for cultivation.

In 32 of the total 62 Municipalities (population 2,601,926) large sums were spent with the object of improving congested areas. The Sanitary Commissioner looks forward to the impetus in sanitation in Municipal areas, which the supervision of the present staff of Certificated Sanitary Inspectors, by the addition, in 12 towns, of 1st Class Health Officers, and in 19, of 2nd Class Officers, will afford. He specially advises that such rulings be introduced on their engagement as will prevent these men becoming "mere post offices" between the Municipal Chairmen and the subordinate sanitary staffs.

The Sanitary Commissioner animadvertes upon the incomplete condition of the sanitary staffs in rural areas. Seven District Boards subsequent to 1903 engaged "Sanitary Assistants" to the District Medical and Sanitary Officer (Civil Surgeon), to fulfil the function of District Health Officers; "for financial reasons," two of these Boards abolished their officers. The permanent executive staff is thus reduced in some of the rural areas to an insufficient number of Certificated Sanitary Inspectors, in charge of Unions and Taluks. On this undesirable state of affairs the Sanitary Commissioner remarks:—

"The employment of Sanitary Assistants is sound in principle and in practice. Judging by reports received from them, they have been of considerable service in districts employing them in checking vaccination work and correcting sanitary errors in towns and villages inspected by them, although funds have not always been forthcoming to give effect to the more important of their recommendations. Their extended employment must follow as the logical sequence of the reforms recently inaugurated; for without an intermediate subordinate staff of Sanitary Assistants or District Health Officers, as they should be rightly designated, and their further sub-division into Sanitary Inspectors, the employment of officers alone will be of little practical value."

The Sanitary Commissioner is able to report a more general adoption of wells in villages according to type designs issued, and records the helpful action of Government in providing, as an experimental measure, correctly covered wells, with semi-rotary pumps attached, in a certain number of villages.

On the Register of Certificated Sanitary Inspectors of the Madras Presidency there are over 700 men who have qualified at their own expense; but the Sanitary Commissioner states that, owing to the indifferent pay and conditions of service offered at the present time, he has found difficulty in securing quickly men for epidemic duty. Hence, on his recommendation, the Madras Government has placed at his disposal a permanent reserve of twenty Sanitary Inspectors, with sanction for engagement of menials for disinfection and other duties. These will be available for duty in any part of the Presidency for emergent epidemic duty, where local staffs require strengthening; and, when not so used, they will be employed for anti-malarial work.

Twenty of the Municipalities of this Presidency have now piped-water supplies, and the Sanitary Commissioner is able to point to a decrease of cholera following their introduction.

In regard to the anti-malarial measures, cessation of wet cultivation in and around the malarious town of Cuddapah has been followed by a decrease of fever mortality of 1.5 per mille. The special malarial officer, Major T. S. Ross, I.M.S., completed his investigation at Ennore and vicinity. His preventive measures have been followed with excellent results, and the Sanitary Commissioner considers that "malarial fevers will completely disappear from the area." The practical measures suggested by Major Ross are estimated to cost Rs.87,000. The area is under the District Board, Chingleput, which received a contribution towards this work of Rs.28,000 from Government.

The Sanitary Commissioner attaches the usual list showing the places inspected, and the duties calling for this action. This suffices to show that the post of Sanitary Commissioner with the Government of Madras is no sinecure. Practically, he was on tour for the greater part of each month during both the wet and hot seasons; implying considerable exposure to climatic conditions, coupled with inspection often involving much physical work—to be followed by prompt compilation of reports and office work. He concludes his Report with the following statement:—

"During the year a steady advance has been made in sanitary progress. While we have reason to be thankful for the advance that is being made, there can be no doubt that advantage should be taken of the improved financial condition of the country to redouble our efforts to improve the sanitation of both rural and urban areas, and thereby retain the position that Madras has held in the past, in matters sanitary, *facile princeps* in India."

Remarks.—The chief note struck by the Sanitary Commissioner is the necessity for completion of the existing sanitary organization in the rural areas of the Madras Presidency, and all practical sanitarians will sympathise with him in recognizing that without both an efficient and sufficient sanitary staff at disposal, efforts towards public health must be largely limited to the *vox et præterea nihil* method of administration. The question is, however, attacked without despondency; for, notwithstanding the defects he specifies, he makes no idle boast that, up to date, the Presidency of Madras is *facile princeps* in sanitary matters in India. There have been few years in that part of India which have not been marked by progress both in sanitary works and sanitary administration. Indeed, in some important subjects connected with public health, Madras has not only preceded in action the rest of India, but also of Great Britain. Such as in the training of certificated midwives for use by public bodies, for free attendance at the houses of the poor and at hospitals (prior to 1862); the compulsory training of Certificated Sanitary Inspectors appointed by both urban and rural local bodies (1893-'94); the discouragement (1890) and ultimately the entire prohibition of use of humanized lymph* by public vaccinators in favour of animal vaccine

*Its use was discouraged by special Government orders in 1890; but difficulty was experienced in maintaining vitality of animal vaccine under tropical conditions during prolonged transport. Experiments [W. G. King] made in Madras in 1890 discovered the utility of lanoline for preservation of animal vaccine. This was adopted and is now employed by the Madras, Bengal and Mysore Governments.

(1894-'95); re-vaccination of all candidates for public employment (1894); the teaching of hygiene in schools (prior to 1880); the compulsory inspection by Government Medical Officers and official report thereon of scholars and schools receiving any form of aid from public funds (1886); the inauguration of examinations in elementary and advanced grade of hygiene* in connection with schools and Government technical examinations (1893); the providing of a Central Institute suitably equipped, whence bodies in charge of administration of 41,000,000 people are supplied with preserved animal vaccine, and the right of aid, free of charge, in bacteriological and chemical matters concerning public health (1902-'03). Whilst the principle of local self-government results in varied degrees of application, the Presidency possesses, in simple form, useful Acts which give sanitary powers in many useful details not yet attempted in Great Britain. Moreover, having regard to former days of scanty funds, when provincial settlements were arranged on the principle of Madras being the "milch cow of India," the Madras Government has never stinted aid to Local Bodies in the matter of sanitary works; so that, seeing the first Government Sanitary Engineer was appointed as late as 1893, the existence of piped water-supplies in twenty Municipalities is no mean record.

NORTHERN NIGERIA.†

Medical Section.—Northern Nigeria has a native population of approximately 9,269,000. It is now a portion of the amalgamated Province of Northern and Southern Nigeria under the Governorship of Sir F. D. LUGARD, with an estimated population of 17,000,000, and an area of 335,000 square miles. This union must prove of advantage in the medical and sanitary interests of both areas, in view of the fast increasing coast and railway communications, bringing with them various problems of public health, which cannot readily be treated from the standpoint of a single Province.

In 1913, of a total of 804 Europeans, 326 were resident officials. Of the former number, the death rate was 16, and of officials considered separately 12·2, per mille. The year was remarkable for shortage of rainfall, which was particularly apparent at Geidam, where only 5·75 inches were registered. Here the rainfall has, according to registration maintained since 1908, shown a steady annual decline as follows:—In inches—22·39, 21·88, 16·71, and 5·76. Geidam also has the distinction of having registered the highest shade temperature, namely 116 F. and the lowest mean relative humidity, 37.

In the matter of provision of hospitals for Europeans, an advance has been made by opening a temporary hospital at Kaduna, but the Principal Medical Officer considers another hospital is necessary between that point (which is to be the future capital of the Province) and

*Up to 1913, 2,755 candidates appeared for the elementary grade, of whom 1,166 qualified, and for the advanced grade (intermediate) 1,826, of whom 1,029 qualified.

†NORTHERN NIGERIA.—Annual Medical and Sanitary Report for the year ending 31st December, 1913. [Principal Medical Officer, F. MANNING; Senior Sanitary Officer, M. Cameron BLAIR.]—fcap. 1914. Printed by Waterlow & Son, Ltd., London.

Ibadan, as well as at Naraguta. The new Kaduna hospital is a railway employees' bungalow, adapted for the special purpose. As a structure it is confessedly a makeshift; the Medical Department has probably done the best in being content with cheap alterations, and as the original and new structures are not differentiated in the plan, it is unnecessary to be critical, beyond suggesting that there is displayed, throughout, less regard of the virtue of perfusion than even the 2,000 feet elevation of Kaduna justifies. In the Northern Province there are three in-patient hospitals of a permanent character for natives; semi-permanent (mud-built with concrete floors) hospitals are also available at 18 stations. Three out-patient dispensaries are supported by native Treasuries; a combined native in-patient hospital and dispensary is also under contemplation.

In 1913, 1,535 Europeans were admitted for treatment, and 22,385 natives. Amongst the latter there were 12 cases of bilharziasis, of *Taenia solium* there were 137 cases, *T. saginata* 426, *T. lata* 2, *Ascaris lumbricoides* 89, *Dracunculus* 426, filariasis 31, ankylostoma 98, *Oxyuris vermicularis* 33. 951 cases of leprosy were treated, sleeping sickness 4, beriberi 7, enteric fever 1, malaria 1,152. It would thus seem that, in suppressing these diseases, there is a large scope not only for curative but for preventive medicine, seeing that the frequency of these diseases can only be vaguely guessed at by using the total number which happened to have applied for treatment. The number of cases of leprosy, even as thus exhibited, must be regarded as of considerable importance in the future history of the Province.

Amongst Europeans, of 13 deaths 6 were due to blackwater fever, for which disease there was a total of 16 admissions. The Principal Medical Officer calls special attention to the fact that there were 62 admissions for diseases of the nervous system, and that 6 persons were invalided under this head.

Difficulties were experienced in securing men fit for training as vaccinators, as well as of staff for supervising them; although this is being attempted with the admittedly unsuitable personnel locally available. 11,801 vaccinations are reported to have been conducted by "dried lymph" supplied by the Lister Institute, with the success rate of 84.8 per cent. How grave is the necessity for pushing vaccination on a sound basis is evident from a table supplied in the Report, from which it is found that in a population of 11,892 small-pox mortality was at the rate of 10.9 per mille, with a death rate of 29.3 per cent. of the attacks; in another of 10,000, the small-pox death-rate was 9 per mille, and in a population of 8,545, 22.1 per mille; so that the disease was a veritable scourge. The Medical Officers in the station concerned enlarge upon the usual serious aftermath of ear and eye diseases. The writer suggests that with Kaduna within sight as the new capital, and situated in a comparatively cool climate, it should be possible to open a vaccine institute combined with bacteriological laboratories for the Province, and thus get over the difficulty of importing lymph; whilst either Egypt or India should be able to supply the class of Mahomedans required for vaccinators and their supervising staff, as a temporary measure pending further educational possibilities locally.

Altogether, the record of medical work for the year in this Province represents steady advance and foresight as to the requirements of a country undergoing quick-change incident to the process of opening up.

Sanitary Section.—In the process of opening up of Northern Nigeria, the Sanitary Department has necessarily had much of its time, during 1913, occupied in selecting new sites for civil stations and in advising as to their planing. Obviously also, sanitary care of no light nature was requisite along the lines of the railways, now completed and in process of construction. It is satisfactory to find, therefore, that in the hands of so well-known an organizer and administrator as Sir F. D. Lugard, there has been no loss of time in clearly defining the sphere of Sanitary Officers in these important matters, by requiring inspection of each station, in accordance with a ruling which we reproduce under Sanitary Legislation and Rulings. The fact is worthy of attention, as co-operation between sanitary and engineering authorities can be secured solely by definite official rulings. The Sanitary Officer is liable to underestimate engineering, and consequent financial, difficulties in carrying out sanitary proposals and, on the other hand, the Engineer is apt to regard with a light heart flaws in his methods of meeting sanitary demands, that may appear to him trivial, but in the opinion of the Sanitary Officer may render the whole of the proposed expenditure inoperative.

Nothing but cordial discussion between the two experts and the appointment of a final authority—in this case, the Governor—for decision, when a difference of opinion arises, can secure the best results in the public interests. It is in this respect that Sanitary Boards serving direct under Governments often fulfil the desirable function of balancing different opinions.

In regard to sanitary supervision of railway lines, the Sanitary Officer reports that this is carried out by attaching English-speaking Sanitary Inspectors—whether technically trained or not is unstated—to the Medical Officers in charge of the various sections of the Railway, whilst at each main station there is at disposal a conservancy gang, and at each minor station a scavenger.

In an interesting history of sanitation in the country from the period of its occupation, the Chief Sanitary Officer shows how intimately connected sanitation has been in the past, and in future must be with the general progress of the country. The work effected in the short period since the Niger Company ceased operations in 1900 is remarkable. The usual course has been reduction to good order of newly-acquired territory by the placing of garrisons. Medical officers attached to these conjoined their duties to the military with medical help of the native population, and did their best as pioneers of sanitation. Then followed civil medical officers, who were attached to single important stations to serve large areas. These stations were gradually multiplied, and there followed differentiation of medical and sanitary duties as the latter requirements grew in importance. The history is typical of medical and sanitary evolution in all our tropical possessions.

The Chief Sanitary Officer is strong in his belief in the good faith as to sanitary advance of the large Mahomedan population he has to deal with, and repeatedly appeals to the fact that when approached

on the subject in a reasonable and tactful spirit instead of, as he puts it, in the guise of an "understudy of the proverbial bull-in-a-china-shop," they exhibit a full appreciation of sanitary reforms. Indeed, he thus sums up the subject:—"To leave the Mahomedan North and come South, nearly everywhere in Pagan country where sanitary progress is being made—and material progress is being made—it begins in isolated Mahomedan settlements and radiates." Lastly, whilst he by no means counsels ignoring the teaching of sanitation by precept, he insists upon the great principle of teaching by demonstration, by means of actually completed sanitary work, which method certainly commends itself to all sanitarians dealing practically with oriental people of the lower classes; thus he states: "the indigenous native is a most sceptical person, but with him 'seeing is believing.'"

In Notes dealing with the prevention of special diseases, the Chief Sanitary Officer points to the fact that the new Eastern Railway from Port Harcourt will pass through the reputed sleeping sickness area, and holds that the appointment of a special officer in this connection is of urgent moment, on the principle of "a stitch in time saves nine." The danger of importation of yellow fever from the coast is recognized with, however, the statement that up to date, it has never established itself in the Northern Province, notwithstanding locally the presence of favouring factors, and he suggests an "unknown but benevolent *tertium quid*." At present, passengers by road and rail are medically inspected, but canoe traffic, which is large, is regarded as unmanageable in this sense. There must undoubtedly be difficulties; but the danger is so great that we suggest that in the presence of increasing traffic, at least at periods when conditions on the coast point to special fear of incidence, the difficulty should be tackled. So far the mere inspection of travellers (and even here limited to use of special means of transport), can exclude but one aspect of the matter; possibly action against the mosquito by fumigation, as pursued in American fruit ports, might be feasible of local adaptation to certain of the conditions. At any rate, it is well to hold in mind that the chances are always that the "*tertium quid*" is nothing more solid than the "law of chances."

Formerly, typhoid fever has been regarded solely as the occasional disease of the imported Europeans, but, during the year, 13 cases amongst natives were reported, with one death. Details of this incidence would have been welcome in a Sanitary Report. Taking the facts as stated, however, there is here disclosed a fact that the presence of increasing concentration of the populations upon mines, and centres commanded by railways, affords ground for great watchfulness and, in these particular areas, the early pushing of the usual sanitary measures which protect a population from fly-borne and water-borne diseases.

EAST AFRICA PROTECTORATE.*

So largely do physical, economic and climatic conditions differ within the area of the East Africa Protectorate that the Principal

*EAST AFRICA PROTECTORATE.—Annual Medical Report for the year ending 31st December, 1912. [Principal Medical Officer, A. D. MILNE.] 83 pp. fcap. 1914. Printed by Waterlow & Son, Ltd., London.

Medical Officer considers that it facilitates a comprehension of medical and sanitary matters to discuss them according to regions, which he classifies as the "Coast Zone," the "Mountainous Zone," the "Desert Zone," and the "Kenia and Nyanza Provinces." Malaria is in varying degrees common to all, but the Goshia District, in the Desert Zone, is alone described as "heavily affected." Some increase is stated to have occurred in the Kenia Province and is ascribed to return of infected labourers from the Coast Zone, and the mosquito-bearing facilities of native water supplies. Filariasis and leprosy are recorded as "fairly common in the Kenia and Nyanza Zone," whilst tick fever has been identified in the Fort Hill District. In the Coast Zone there is no dracontiasis, but there are occasional cases of bilharzia.

During 1912, in a total of 592 European officials in the Protectorate the death rate was 9·5 per mille. In Nairobi, the death-rate in the general European population was 15·8, against 21 per mille during 1911. In respect to the native population registration of deaths only is attempted, and this is confined to townships. The death-rate in Mombasa was in 1912 28·4 and in Nairobi 22·9 per mille.

From a public health point of view, the most satisfactory fact recorded is the diminution of sleeping sickness, as it is now rare for cases to be discovered amongst out-patients at Kisumu, and "with the annual emigration of some 30,000 Kavirondo labourers from the Province, rarer still for an odd case to be picked out from the line."

When, however, progress is looked for in routine matters, it is found that practically no advance has been made since 1912 and, excluding rural areas from consideration, this is applicable to all details in the important towns of Nairobi, Kisumu, and Mombasa—all of which have had plague epidemics. The Principal Medical Officer deals frankly with this state of affairs, by pointing to the slender staff, Medical and Sanitary, at disposal, owing to rapid advance of the country outstripping the present organization; and he looks forward to a better state of affairs after Professor W. J. SIMPSON's late deputation to the Protectorate by the Colonial Office.

PUBLIC HEALTH SERVICE OF THE UNITED STATES OF AMERICA.*

This is an interesting and instructive record not only of work fulfilled in the various States of America and its possessions in the tropics, but of facts of sanitary interest collated in all important ports of the world, affecting trade communications with that country. To gain quick and accurate intimation of disease prevalence, America is not content with Reports from Consuls, but places members of its Public Health Service at chief ports in direct correspondence with headquarters at Washington. An expansion in this direction would seem reasonable by the Empire of India, in reference to the possibility of yellow fever following the new trade routes consequent upon the opening of the Panama Canal. Such outposts would,

*Annual Report of the Surgeon-General of the Public Health Service of the United States for the Fiscal Year 1913.—318 pp. 8vo. 1914. Washington: Government Printing Office.

with telegraph communication at disposal, form a sound first line of defence.*

The following information is abstracted from the Report as likely to be useful in practical hygiene work in the tropics :—

Plague.

In the *U.S. Public Health Reports* for April 1912, Assistant-Surgeon McCoy stated that on the Hamakua coast of Hawaii plague infection of rats existed. But he drew attention to a peculiarity: when the study of the disease in man in this region was undertaken, it was found that all the cases but one had the bubo in the neck. He states :—

“It is well known that when plague is induced in experimental animals by feeding infected material, in the great majority of cases a bubo develops in the neck; hence, one is justified in suspecting that when a series of cases in human beings occur, in which cervical buboes predominate, we must consider it at least possible that the usual mode of transmission (through fleas) may not have operated in these cases.”†

In raising this point, Assistant-Surgeon McCoy has nothing to say against the important rôle of fleas. On this subject the Surgeon-General, after stating that McCoy had again visited the locality (Dec. 1912), refers to the nature of plague found in the same area in 1913, thus :—“Most of the cases present cervical buboes and are of the pneumonic type of the disease.” It is hoped that an explanation of this condition may yet be forthcoming, as the Surgeon-General suggests the necessity for the constant presence of a Medical Officer on the spot.

The facts seem to us to point to tonsil infection by contaminated fingers or of cold cooked food, such as might well arise in the presence of infected rats and fleas. We have no figures to prove the fact, but the impression gained during several years' plague inspection work has been that cervical buboes increase in frequency at the period when plague incidence in both the rat and human population is at its height, and is coupled with decreased efficiency of domestic and public general sanitary control. If this impression (formed without any theory to prop up at the time) has anything in it, it would be necessary to regard the average incidence of cervical buboes not during a whole epidemic, but whilst conditions were judged to be as described and at their zenith. On the other hand, it is well known that cervical buboes may predominate in mild outbreaks at the commencement of plague, as in Mesopotamia, and Mettapolliem, Madras Presidency, before rat plague was identified. In this connection, as influenza has no more respect for the tropics than for a temperate climate, it is well that the fact that cervical buboes may be present in certain epidemics of that disease should not be forgotten.

At Iloila, Philippine Islands, a Chinaman was attacked with plague on the 5th July, 1913. He was proved to have been a resident for a long period. No further case occurred till August 18th. Six more cases followed at shorter intervals, the last being in September. “In

* Such an expansion has been recommended by Major JAMES, I.M.S. (see this *Bulletin*, Vol. 3, p. 181 and *Indian Journal of Medical Research*). Ed.

† McCoy (G. W.). A Note on a Peculiarity of Plague on the Hamakua Coast of Hawaii—*U.S. Public Health Reps.*, 1912, Apr. 5, Vol. 27. Pt. 1. No. 14. p. 490.

spite of very extensive rat catching, which was done over a period of five months, no plague-infected rats were found at Iloilo. All the cases occurred in two houses, and there is considerable evidence to support the belief that the plague in Iloilo may have been introduced by bed bugs."

In Manila, a first human case occurred on June 17th, 1913. Rats were caught at the rate of approximately 3,000 per month, but it was not till August 31st that a plague-infected rat was found in a formerly infected block. Up to October, the percentage of plague rats found was only 0.005. Very few dead rats were discovered. In contrast, 13 human cases were found between October 20th and October 22nd amongst labourers employed at the Dagupan Railway Station, and subsequently 17 cases were traced to the same source. The disease was successfully eradicated from this focus by rapid action against rats, which were shown to be infected.

Deratisation.—At San Juan, 50 rodents were killed in ships by fumigation; most of these were obtained from vegetables in crates such as garlic and onions, the dry stems of which were found to afford good shelter. In 1913, in a single ship 154 rats were killed.

As objections were raised to the use of sulphur fumigation for vegetables, it was ordered that hydrocyanic gas should be employed. Rats in cages were used as controls. The result was satisfactory, but in the meantime control experiments with sulphur conclusively proved that objections to it were founded on mere prejudice, as neither in regard to edibility nor subsequent preservation of the vegetables was there any reason to object to its employment. It is not stated what precautions as to human life were taken in using the hydrocyanic acid gas, but the proportion of ingredients employed was, for each 100 cubic feet:—potassium cyanide 1 oz., sulphuric acid 1 oz., water 3 oz. Altogether, 60,000 baskets and 3,000 crates of vegetables were fumigated. In burning sulphur for ship fumigation, the Americans apparently do not require the employment of special apparatus such as the Clayton so much employed on British ships; sulphur is not infrequently burned in open pans, with the precaution of surrounding them with water.

Yellow Fever.

Surgeon J. H. WHITE, U.S.A. Service, was deputed to Jamaica with reference to the opinion of Captain Potter, R.A.M.C. that the "vomiting sickness" of Jamaica was probably yellow fever. After being afforded every facility for the investigation, he concluded that the disease is a "meningitis," on the following grounds:—"It occurs in winter and ceases in the first warm weather; it occurs in the hills and seldom on the coast; it attacks blacks in preference to whites or Hindus; it occurs most often where *stegomyia* are least frequent; the interval of time between primary and secondary cases is not sufficient for yellow fever."

Dr. Harold SCOTT, Government Bacteriologist, Kingston General Hospital, Jamaica, does not consider this conclusion altogether correct; after a large amount of clinical and bacteriological work on the subject, he holds that "though cases of meningitis occur amongst those reported as 'vomiting sickness,' the two diseases are

not identical. After the former have been included, a large proportion still remains unaccounted for, so far as actual knowledge of the cause goes at present.”*

Dr. AMES in inspecting Guatemala City found *Stegomyia* at the altitude of 5,000 feet, which fact may be read in connection with one of Surgeon White's findings just mentioned.

Surgeon White inspected the fruit ports of Belize, Livingston, Puerto Barrios, Puerto Cortez, Puerto Limon, Bocas del Toro, and Almirante. He considers that the British port of Belize is in an exceptionally good condition, and that the quarantine method against yellow fever is sound, with however the exception that “anti-mosquito work is needed.” This reference to connection of fruit ports and yellow fever transmission ends with the following statement, based upon eight years' familiarity with the coast concerned—“that the greatest risk of infection by far is *via* the Guatemalan Railroad, and not by sea, and that the infection of one of these northern fruit ports may, and probably will, result in the infection of all, and therefore it would be well to watch them the whole year round.”

Of the notorious port of Guayaquil, it is reported that “owing to the screening of the hotels, the number of cases of this disease amongst the foreign population has been considerably less than in former years.”

Ankylostomiasis.

At San Francisco, all oriental aliens are examined as to various health and other conditions, under the American Immigration Law. Of 13,383 examined (nationality not stated) 1,888 cases of ankylostomiasis were found. It is held that, whilst in regard to the white races the general appearance as to anaemia and lassitude arrests attention, the microscope should invariably be used for oriental cases, as the usual constitutional symptoms were not demonstrable, there having been detected “infection in people with unusually good physique and healthy appearance.”

**Reports to the Advisory Committee for the Tropical Diseases Research Fund*, 1913, p. 171.

DISEASE PREVENTION.

MALARIA.

Malaria in Bengal.

Bengal has at the present time a population of 46,305,642 and an area of 84,092 square miles. If the exceptionally large urban area of Calcutta and its suburbs be excluded, 96 per cent. of the people live in villages. There are 124 towns with populations exceeding 5,000 inhabitants. The average village contains about 352 persons. 77 per mille of the population is literate, and there is a primary school for every three square miles. Except within the Municipalities, where an organisation is already sanctioned, there is no executive sanitary staff. 34,937,572 of the population depend upon agriculture for their support. The corrected death rate from all causes, as deduced by Mr. ACKLAND for the Board of Trade, was for the decade 1901-1911 not less than 40 and, probably, 48·7 per mille. The death rate from "fevers," as registered by an indifferent agency, was 21·16 in 1912.

The land is delta under formation in parts, especially towards the east and south, and is in a more or less completed formation towards the west, as a result of deposit of silt derived from the water of the Ganges, which is distributed by minor rivers through the delta. Both the mother river and the distributory rivers are subject to changes of direction. In the latter there is a tendency for silt to so accumulate above the original beds that ultimately they become higher than the average level of the country, and, when not restrained by embankments, lead to dangerous floods in villages. Much of the total land is in normal circumstances flooded at the height of the rainy season; and, in recognition of this fact, villages are, as far as possible, placed on available hillocks. In the north the elevation of the delta is 70 feet, and in the south from 10 to 20 feet above sea level.

The following is a description of the average village, as given in a Report* of the Jessore District by Captain STEWART, I.M.S., and Lieut. PROCTOR, I.M.S.:—

"The majority of the villages in the District consists of a number of separate homesteads scattered over a large area, each homestead being occupied by several members of the same family. The houses are built of split bamboos raised on a mud plinth of varying height, and in close proximity to the dwelling-houses are the sheds for cattle, the houses and sheds usually enclosing a central courtyard. The whole village is embedded in a dense tangled mass of jungle and bamboo thickets, and through this run numerous paths winding in every direction. Beneath the thick

* STEWART (G.) and PROCTOR (A. H.) Report on Prevalence of Fever in Jessore and Murshedabad Districts, India, 1907; embodied in *Report of the Drainage Committee, Bengal Presidency Division, 1907*. Calcutta: Printed at the Bengal Secretariat Press.

undergrowth round each house lie countless numbers of pits, from which earth for the plinths has been dug; during the rains and for long afterwards these are stagnant foetid pools, full of rotting leaves and vegetable matter. No sun reaches them, so that evaporation is slow, and they remain for months in convenient places in which the female mosquito, heavy with her latest feed of blood in the neighbouring house, can lay her eggs, and swarms of larvae find ideal surroundings for their growth. The adult mosquito, too, finds shelter during the day from sun and breeze in the shade of the jungle round the houses, and the more domestic species obtain a resting place undisturbed by smoke in the cowsheds alongside. To the inhabitants the jungle affords privacy in their households and probably some protection from cold breezes in the winter, but it is also a convenient latrine and the stench in some of the villages is overpowering. The drinking water supply is generally extremely bad. Villages on a river take it directly from the edges, generally at a spot which is used as a bathing ghat, whilst the banks in the close proximity are made use of as a latrine. . .

"The rivers and tanks from which drinking water is obtained are also often used for steeping jute. . . . This extremely insanitary condition is combined with a general water-logging of the soil, shown by the high level of the subsoil water where it could be estimated, and by the innumerable marshy tracks and bheels [lakes or marshes] scattered all over the country, and it is to the combination of the two that the extreme prevalence of malaria may be attributed."

As to the economical and social condition of the people, the ryot [farmer] has become, with the passage of time, well-off in view of the steady rise of prices of rice and jute. The labourer population is, however, readily adversely affected by failure of rainfall or other conditions upon which agriculture depends. Every hundred ryots employ, on an average, 12 labourers.

The three Districts chiefly affected are Jessore, Nadia, and Murshebabad. Their previous history shows that, though malaria underwent aggravation at the time of the Burdwan epidemic, it had existed in 1770. The total area of Bengal held to be markedly malarious is chiefly comprised in the districts mentioned, and is estimated at 5,780 square miles. Within the more or less malarious tracts about 1,973,800 acres are under rice cultivation.

In response to public opinion the Government of India, in 1906-07, deputed Captain STEWART, I.M.S. and Lieut. PROCTOR, I.M.S. to make a special Report on malaria conditions, which was to be considered by a Drainage Committee, consisting of one officer of the Indian Medical Service (Lieut.-Col. CLARKSON), Mr. W. A. INGLIS, of the Public Works Department, and Mr. H. WHEELER, of the Indian Civil Service. This was followed by the deputation of Major A. B. FRY,* with the object of extending the enquiry of his predecessors on certain points. It is to the Reports of these authorities that we refer in discussing this subject.

* FRY (A. B.) (i) First Report on Malaria in Bengal.—42 pp.+v. pp. fcap. With 10 maps, 11 charts, and numerous tables. 1912. Calcutta: Bengal Secretariat Book Depôt. (ii) Second Report on Malaria in Bengal.—37 p. fcap. With 4 maps and 2 charts. 1914. Calcutta: Bengal Secretariat Book Depôt.

The first task in investigation in dealing with vital statistics, which necessarily rely upon diagnosis (or artificial memory processes) by village servants, was obviously to differentiate death causation under unclassified "fevers," so as to ascertain how far malaria is responsible for mortality. Fry gives results of enquiries into clinical histories of cases, as conducted by Asst.-Surgeon Mithilias Chandra GHOSH, in Dum-Dum thana, for a typical rural area. He shows that 36 per cent. of "fever" deaths were probably due to malaria, and that these constitute 24 per cent. of the total mortality.

Using the spleen rate as the test of the endemic and hyperendemic areas, Fry and his assistants examined 1,082 villages and 42,580 children. In the 24-Parganas the rate varied from 17.3 to 84.5; in the Nadia District from 70 to 83.8; in the Jessore District, from 17.3 to 84.5; and in the Murshidabad District from 44 to 90.6 per cent. Whilst acknowledging the existence of kala azar as a possible cause of the splenic enlargements, he holds this disease to be sufficiently small in prevalence to be negligible, in this particular connection. In Jessore, the endemic index varies from 20.8 to 36; in the 24-Parganas from 8 to 33.3, and in Murshidabad from 16 to 46.1. The "spring" fever mortality rate reaches its apex in April, followed by a decline; a winter increase occurs in September, reaching its apex in November, that is, coincident with the cessation of rain; the period of least mortality from fever is held to be June or July. The rains commence in the second week of June and end in the last week of October; in the area under discussion, the total average rainfall is about 63 inches. The remaining months are "dry." In this connection we may quote a lay author, who states that the rice fields "in Bengal are moist till September, begin to dry up in October, and by April and May are quite dry and cracked." The following is a list of mosquitoes identified:—*Nyssorhynchus fuliginosus*, and variety *adiei*; *Nyssomyzomyia rossii*; *Myzorhynchus nigerrimus*; *Neocellia fowleri*; *Myzomyia culicifacies*; *Myzomyia listonii*; *Myzomyia albirostris*; *Myzorhynchus barbirostris*; *Nyssomyia rossii*, variety *indefinata*. Of these, Fry states:—

"The commonest is the *N. fuliginosus*, which exists in greater numbers than all the other species put together. It exists in enormous numbers during the autumn and winter months, and remains numerous up to the end of January. The numbers gradually diminish through the hot season. It does not begin to increase until late in the rains. In September an increase begins, progressing steadily until the enormous winter population is fully established in November. The favourite resting place for adults is the roof of cow-houses, in which they swarm, and I have counted as many as 60 on a single cobweb."

Proctor and Stewart kept the question of subsoil-water level in mind in respect to its favouring the production of pools and, consequently, mosquito propagation. They were, however, unfavourably situated as to reliable information. Their conclusion was that "the high spleen rates do not correspond with the tracts of country having the higher sub-soil water after the rains." They founded this on the fact that whilst in 43 villages in the Murshidabad District the average level was 2.7 feet from the ground, in 4 thanas [small administrative areas] where the spleen rates were higher the average sub-soil water level was 3.6 feet.

and in two thanas, where the spleen rates were lower the average subsoil level, in twenty villages, was only 1·4 feet. The Drainage Committee, in remarking on these results, states:—"The general connection between the prevalence of malaria and the height of the sub-soil water is deserving of further investigation than it has yet received in Bengal. Captain Stewart and Lieutenant Proctor have endeavoured to collect some data, but we do not consider that great importance can be attached to them. They were necessarily not based upon accurate and regular observation." . . .

The Drainage Committee classify Proctor and Stewart's results connecting malaria prevalence with physical features of the country as follows:—

Situation.	No. of villages. examined.		Average spleen Rates.	
On dry land	..	45	..	45·6
On live rivers	..	33	..	46·0
On bheels	..	56	..	62·2
On dead rivers	..	38	..	64·5
On flushed bheels	..	36	..	66·0
On unflushed bheels	..	7	..	79·4

Fry's investigation was inspired by the requirement to get further proofs of the facts thus brought together by the Drainage Committee from information supplied by Proctor and Stewart; but the whole tendency of both his Reports is to show that his personal experience is that, granted the presence of an efficient mosquito and the human gamete carrier, local conditions as affecting increase or inhibition of mosquitoes are of little import. He would deduce from his own observations a ruling "that when the human infection rate reaches a level which is measured by juvenile spleen rate of 30 to 40 per cent., then the number of recoveries exceeds the number of new infections and malaria dies out automatically, and with progressive rapidity." He supports the theory by no figures applicable to such a deduction, but alludes to a mathematical calculation by Ross ("The Prevention of Malaria," Second Edition; Sect. 28 and 66).

Whilst the formulæ referred to take cognizance of conditions as found in a locality at a certain period, it is not apparent Ross would desire to ignore variable physiography, meteorology and movements of populations acting and re-acting upon malaria spread, and to lay down a law as to the limit of remedial measures, in an area of 84,000 square miles. Yet Fry's arguments lead him to insist that the "most important antimalarial measure is to reduce the number of human carriers by quinine, and that a certain point will be reached when the human carriers are sufficiently few for the number of recoveries to exceed the new infections, and then the progress to zero will be automatic and rapid."

Fry's theories are based on the supposition that he found, in the south of the Howrah District, a line of country which did not differ in physical characteristics from the hyperendemic areas—yet was not malarious. He discovered that "in the Presidency Division the *N. fuliginosus* is in vast preponderance, but in the Howrah District, though *N. fuliginosus* is very common, yet *N. barbirostris* and

Myzomyia form half the anopheline population." . . . Throughout the investigation notes were made of physical conditions. From these and my own observations, I can assert that the southern part is more swampy, more jungly, and has just as many mosquitoes as the northern part, and in no way can the absence of malaria be attributed to improved environment of the villagers." Surely a condition that was "more swampy and more jungly," and was more favourable to one species of anopheles (the *M. culicifacies* being certainly a potential carrier) in a different part of the country, meant a change in character or configuration of soil or subsoil, and of surface and subsoil drainage, and could not reasonably be ascribed to similar physical conditions. Had he ascertained what these physical conditions were, there would have remained the problem of importation of the human malaria bearer in connection with the favourable or unfavourable factors here linked together. Further, so long as births continue in a malarious district, and thus new juvenile subjects are provided, the automatic dying out of malaria he contended for must be a remarkably long process. Indeed, if this does occur, a depressed birth-rate is more likely to figure largely in the process than immunity being acquired by adults automatically at a certain rate of juvenile infection. A branch of the law he would lay down is thus stated:—"Endemic malaria does not establish itself by slow propagation but must be preceded by epidemic conditions." This is a wide deduction, which seems but little to merit the word "must." He himself quotes the case of a family at Daharpur who have suffered severely from malarial fever within a malaria free area, and, in the assumed absence of epidemic conditions, he makes no remark showing he regards their presence as of any danger; yet, when he inspected the village of Rajnagar, quoted by Proctor and Stewart as an instance of a village free of jungle and possessing but 11 per cent. of spleen enlargement, Fry found, when after some time had intervened he personally examined the inhabitants, that the spleen rate had increased to 24 per cent. This he accounts for by saying "proximity [of the village] to and connection with its two unhealthy neighbours appears to be gradually increasing the spleen rate." In another locality he speaks of malaria in its gradual spread as behaving "like a contagious disease." Indeed, there are plenty of areas where malaria has gradually increased in intensity, nor are epidemics always followed by severe endemic conditions. Thus, in the area along the Cauvery and the Vagai, in the south of India, which is always a ready example of an irrigated yet malaria free country, there occurred in 1809-10-11 a malaria epidemic as severe* as the notorious epidemic of Burdwan. It followed unprecedented rainfall, causing new but temporary disturbance of surface and subsoil drainage which, in the light of present day knowledge, presumably influenced mosquito propagation. Malaria disappeared at the end of two years, consonant with relief of surface and subsoil waters.

* The mortality of human beings was so great that in many places the crops could not be cut for lack of hands. Chiefly from absence of men to care for them, 44,273 cattle died.

When these statements are considered side by side with the fact that though he was able to prove that *N. fuliginosus*, though sparsely found in human habitations (but plentiful in neighbouring cow-sheds), is an efficient carrier, it is a foregone conclusion that he sees no hope for Bengal, beyond the use of a quinine campaign. Consequently, much of his Report is taken up in the effort to show that "as the natural features of Bengal do not lend themselves to schemes for mosquito reduction, which is the ideal of a malaria prevention campaign, we must endeavour to lessen the incidence of the disease by attacking other factors, so as to reduce the disease by effective treatment of the chronic cases."

Although we consider that the data collected by Fry do not justify this extreme deduction, as applied to not mere localities but a whole province, they are yet of value in securing exclusion of one of the physical conditions concerned, so as to clear the way for application of remedial measures.

Before, however, we utilise this process of exclusion, we would, in agreement with the Drainage Committee, when treating of subsoil water-level, state that the information available from which we draw inferences is exceedingly scanty. We believe that this failure is to be found not in the stinting of labour by the medical officers furnishing the Reports, but in the manner of their conducting it. We hold that it is largely a waste of labour for a sanitary officer to attempt a sanitary enquiry in the tropics connected with malaria prevention, water supply, disposal of waste, or town planning, without being provided with an engineer subordinate absolutely at his disposal. The class of engineering skill required to assist the sanitarian in the enquiries is not great, and merely implies that if he wants to test the character of a subsoil, ascertain a subsoil water-level, measure a flow of water, find the gradient of an area, make approximate estimates to judge of their feasibility or express his requirement of buildings on a plan, he need not supply the muscle and time to secure his data, provided he be capable of giving directions and checking results.* In the absence of this aid, both Proctor and Stewart's and Fry's Reports are defective in the important requirement of connecting their physical data with their malaria investigation. These officers were provided with Assistant Surgeons and Sub-Assistant Surgeons *ad libitum* in an enquiry which extended from 1906 to 1913, but the essential class of help which would have rendered their Reports definite has been absent, although, in Bengal, a Public Works Supervisor could have been provided at Rs.250 per mensem, or an Overseer at Rs.50 per mensem.

The Relief of Surface and Subsoil Waters.—Fry devoted attention to the question whether it would be advantageous to drain a large bheel known as the Arool. The object of the proposal (which was not initiated by him) was to flush the dead upper reaches of the Bhariab river. Obviously, the mere flushing of this river would not influence malaria much, and as there is a concurrence in the Drainage Committee's Report with this view it need not be discussed. He

*Under "Sanitary Rulings," is quoted a Madras Government Order showing that this principle has been long recognised by it.

was able to show that, in comparison with the rest of the country, the surroundings of the bheel were not more malarious—which, by the way, was in itself a small mercy—and he certainly proves that towards the interior of the bheel the spleen rate was diminished. But Fry forgets to state that, in Bengal, there are bheels *and* bheels, and the following quotation from the Drainage Committee's Report will show that there are differences which suffice to exhibit the influence of continuous sheets of water as compared with marshy land:—

"It cannot be said that bheels which approximate to lakes are probably detrimental to health. They never dry up, leaving large areas of shallow mosquito-breeding pools, and they may be useful reservoirs of drinking water. The charge is rather against the swamp which has either never been drained, or which at one time used to drain more quickly than it does at present." "If the water level in the bheel, by efficient drainage, fell quickly, the surrounding country draining into the bheel would dry more rapidly; hence collections of surface water would be found existing for shorter periods, and fewer facilities would be offered for the breeding of mosquitoes."

It was of course a familiar fact in past years that the covering of large areas with permanent sheets of water abates malaria—a fact in the present day explainable with reference to the edges alone being suitable for mosquito propagation. As a modern instance of successful application of this method we may quote Bhamo in Burma, and more remote instances in the case of the lakes of Bracciano, Bolsine and Trasimeno.

Now we think the contrast drawn by the Drainage Committee as to permanent sheets of water and marshy land points to the possibility of a definite line of action, as to relief both of surface and subsoil waters within the hyperendemic areas.

In the course of delta formation a typical silt contributory stream from the Ganges must, at its origin, pursue a course from a higher to a lower level, and must plough existing alluvial deposits in forming a bed; the trend of the surface soil being ordinarily that of subsoil waters, its sub-streams would be supplied by the pre-existing subsoil waters of the neighbourhood; if the stream cut deeply into the alluvial soil, in making its bed, it would, by extension of the drainage cone, fulfil all the usual functions of a river as a subsoil water recipient from an extended area. But, in time, the new-formed river would accumulate silt in its bed, which would tend to deflection of the current in new directions; and given a state of seasonal small volume and low velocity, the silt would cause inflow to be arrested, or diverted at certain points, especially in respect to clay particles and manner of deposit, if tending to choke the soil interstices (voids) within the limits of the incoming subsoil water. As time advanced deposited silt would cause the familiar raising of the bed level, but below this the old sub-stream (subsoil) water would still pursue, in the main, the course of the old trend of the country, although here and there deflected. Under such conditions, in a country enclosed by two parallel rivers, running at right angles to the trend of the country in its later formation, there may occur comparatively water-tight compartments. In illustration of such varied conditions, resulting in delta land, we may state that we have seen rivers with sub-streams within a few feet of each other

vertically which were brackish and sweet, respectively; and that a dead river course hidden within the subsoil, with its still living sub-stream, could be so closely defined that brackish water could be obtained immediately outside the bed within which was sweet water. As a further advance in formation of the typical river we have traced, silting would become so complete that at certain spots a "dead" river and, later, an interrupted course would result, with here and there a depression unfilled with silt; whilst, in other parts, the river bed would be so raised by accumulation of silt above the general level of the country that, by overflow of its banks, older depressions at lower levels would be more or less abolished by silt. By such additions from distant sources of silt and by local attrition by rainfall, the course of old dead rivers must be gradually obliterated. Great depressions might however remain unfilled, and, *where these represent old river beds*, not only would the influence of the subsoil water be more readily evident within them, but, as spots below the level of the surrounding country, the receipt of surface water would also be favoured. We suggest such depressions are the *permanent "bheels."*

In referring to the delta, the Drainage Committee give the following opinion as to the direction in which formation has proceeded. They state:—

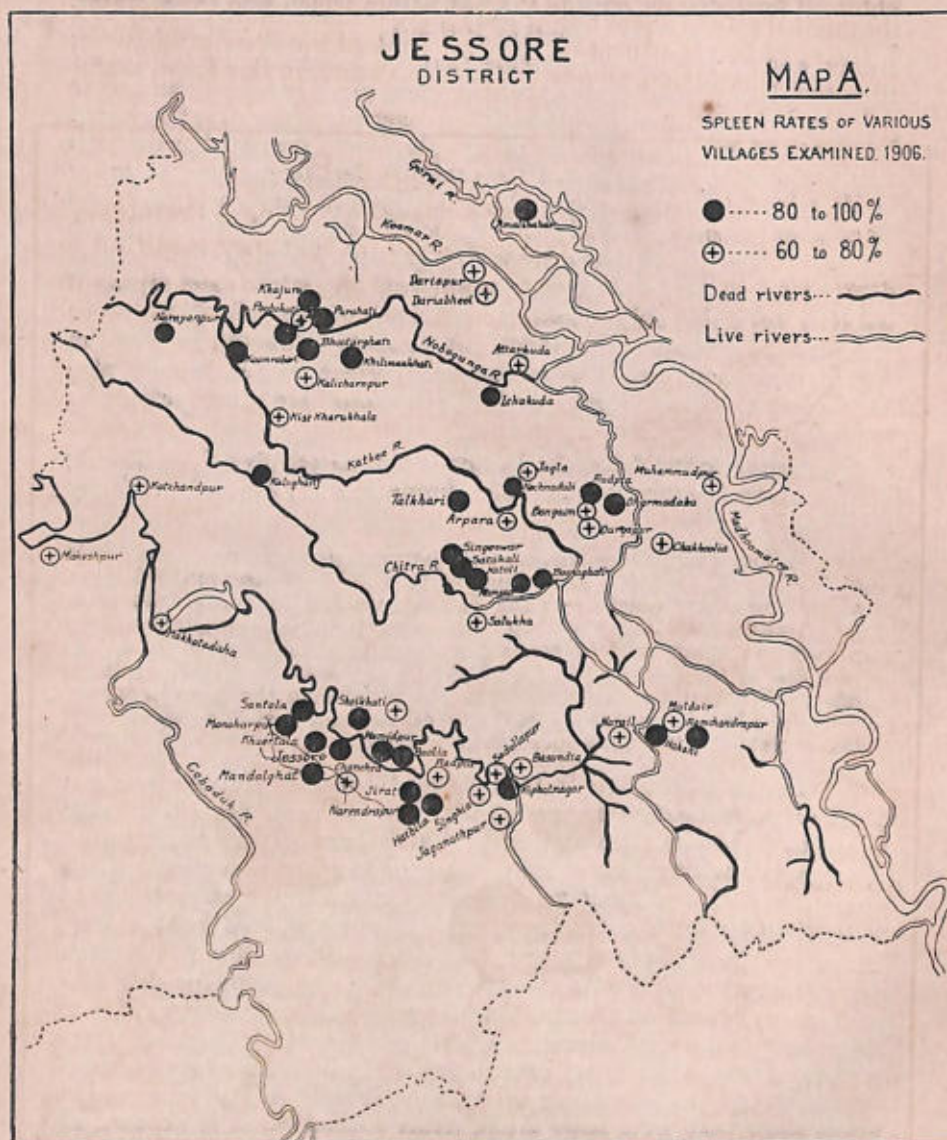
"These four channels constitute the main arteries traversing the whole tract from north to south from which so much of the water of the Ganges flows as does not proceed down the Padma towards Goalundo. Between these arteries are various distributory streams, running generally from the north-west to south-west (*although the direction is now the reverse on the eastern side of the Jessore District*), but in some cases tending in a more southerly direction. . . . The process on the western side is now more or less an accomplished fact; on the east it is in progress, and in the centre it is gradually increasing." [*Italics not in the original.*]

We thus enter into details, because we think they demonstrate the possibility of utilizing practically the Drainage Committee's division of bheels into those of mere marshy land and those of permanent sheets of water, as well as their opinion as to there being a general subsoil water level of the country, but accompanied by interruptions of water-tight tracts. We would argue that, in an area where Sir Alexander BINNIE's datum* for a similar country as to evaporation from water is not likely to be less than four feet in the dry season or five feet *per annum*, these permanent bheels fulfil the useful function of *conveniently exposing subsoil water bearing strata*—otherwise their permanency would be out of question. Similarly, Fry's statement that "all tanks and most borrow pits contain water all the year round" would show that, over large areas, either subsoil water is exposed at shallow depths, or its influence by capillarity on soil, by reason of proximity to surface level, is sufficient to readily favour complete saturation in the presence of additions by surface flow.

If these arguments be sound, a definite policy is feasible in respect to the markedly malarious triangular area between the Bhagirathi River, Ganges and Gorai Rivers, within which is situated the Jessore,

* BINNIE (Sir A. R.). "Rainfall, Reservoirs, and Water Supply." 1913. London. Constable & Co., Ltd., Publishers.

Nadia and Murshidabad Districts. In this country, as shown by the maps given by Proctor and Stewart (Map A), which we reproduce



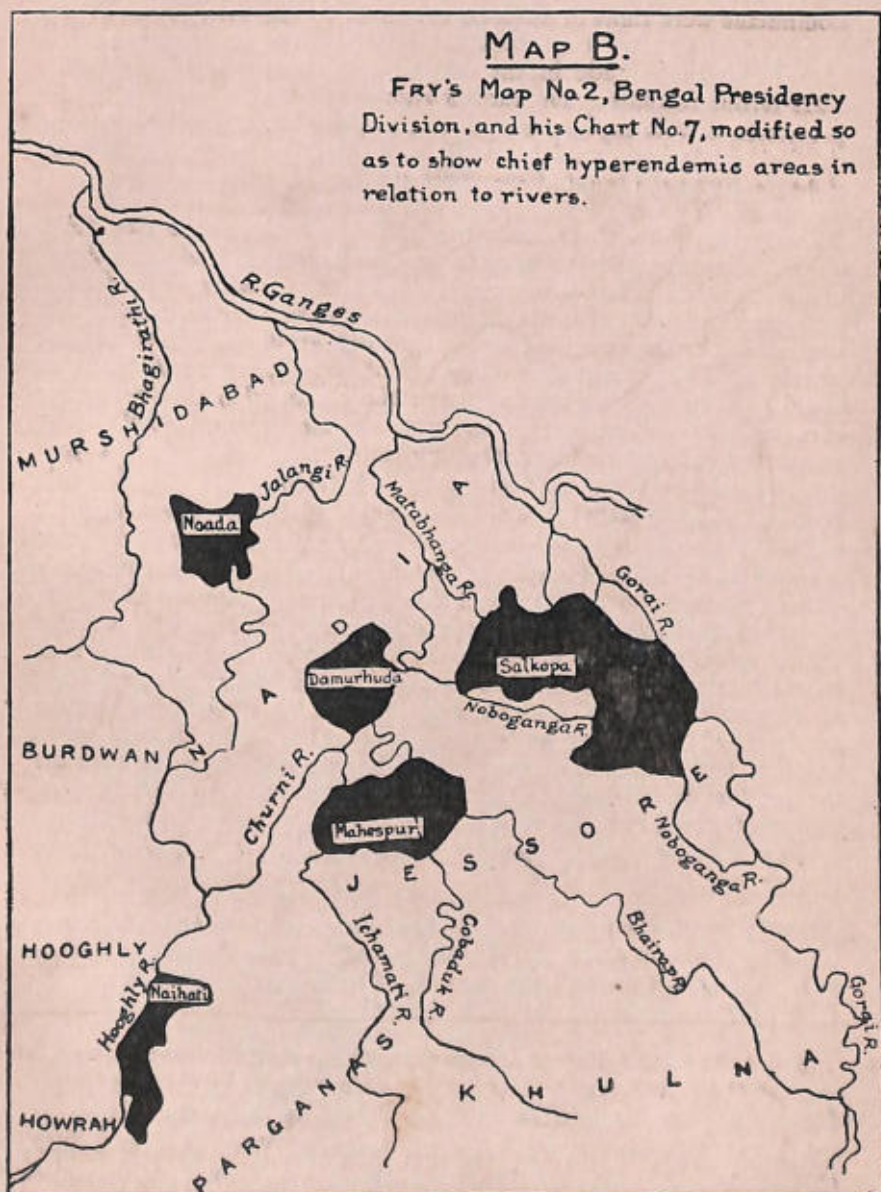
PROCTOR and STEWART'S Map of Jessore District, showing relation of spleen rates to dead and living rivers, modified so as to exclude rates below 60.

modified as stated thereon, the influence of old dead rivers running at almost right angles to the present trend of the country to the south is obvious. As another test, we would state that if a diagonal line be drawn through Fry's original map No. 3, giving spleen rates, (on which he relies to show that neither dead nor living rivers have

any influence on results) so as to pass through the dead river areas, the spleen rate is found to be, on an average, 73, against 55 along the east bank of the Gobaduk—a river partly dead, but which has a south trend, and, therefore, serves an area where interference with the original subsoil water flow is less likely. Again, in Fry's map No. 7, the same fact is evident on the east bank of the Bhagirathi River. But the Naihati-thana stands out as a small and, in this sense, useful

MAP B.

FRY'S Map No. 2, Bengal Presidency Division, and his Chart No. 7, modified so as to show chief hyperendemic areas in relation to rivers.



exception in our modified Map B as conspicuously malarious—notwithstanding the service of the Hooghly, a living river. We suggest the chances are here that, irrespective of obvious surface obstructions to which the Drainage Committee calls attention, there is an obstruction of subsoil flow from this area by a compact silted bank. Whether this be the case or not, the ease with which the place can be supervised from Calcutta and the danger of spread of malarial fever from this focus in that direction, seems to us to dictate that the Drainage Committee were right in advising attention to this area as one of the first that should be dealt with. Similarly, although they conceded efforts had been made in the matter, there was sound ground for their recommendation that further enquiry should be made as to the perfection of drainage in the embankments of the Central Section of the E.B.S. Railway, which, to the south of Jessore, runs at almost right angles to the trend of the country.

Ordinarily, bheels are recipients of drainage from the rice fields and villages *en route* to rivers *via* “*khals*” (artificial or natural channels). In this they probably fulfil the excellent function of balancing reservoirs, and thus prevent floods. Where removal of obstruction in *khals* would not sufficiently lower the water level of bheels for effective surface drainage of an area, it is evident that this could be effected by pumping, with the object of not only making sure of relief of surface water but, *in the case of khals of a permanent character*, of depressing and maintaining, at a pre-determined point, the subsoil water. Incidentally, a considerable part of the 256 square miles of bheels would be rendered available for cultivation, and therefore yield some compensation for capital sunk; and, as the Drainage Committee remarked, the water might be available for domestic water supplies of villages. Further, they might provide water for irrigation for second crops, in the presence of correct measures for removal of surplus water, as the total lift to command the land would rarely be great. Were several such permanent bheels selected, there would be established pumping centres for subsoil and surface water relief distributed, as far as possible, on a radial system, so as to affect a wide area of country. In this manner could be fulfilled the *desideratum*, as to which the Drainage Committee, Proctor and Stewart, and, probably, Fry agree, that a system is required which will remove, rapidly, in November, surplus moisture after completion of rice crop cultivation.

The system we suggest would particularly meet the possible existence of water-tight compartments of country and might well be a preliminary to large drainage works, because it would define the limits of the utility both of drainage channels and of pumping.

So far, in the 24-Parganas, drainage channels have been made or are contemplated which largely follow the contour of the country. In the hyperendemic area of the older delta formation, however, drainage would be required on much more seriously developed lines, so as to tap the subsoil water. The problem of attaining this end is one of local financial and engineering interest, in which we suggest the Bhairab river, or the line of country it pursues, would inevitably figure largely in fixing a main channel.

The idea of pumping Bengal bheels must, when the Drainage Committee wrote their Report, have been considered Utopian, and was therefore not entered into ; but, if Lord KITCHENER has concluded that the Humphrey pump places at disposal a sufficiently economical method of drainage in Egypt (in delta land), their employment in selected areas in Bengal should not be regarded as absolutely unreasonable. For Egypt eight Humphrey pumps, *plus* two in reserve, have been ordered. The eight will discharge per day 792 million gallons with a lift of 19 to 20 feet.

In regard to the khals, which under any system would have to be carefully cleared of obstructions, the use of bheels for pumping centres would have the advantage of little necessity for diversion of the present routes to rivers, or of surface waters from villages and fields to bheels.

For the rest, the problem of surface drainage must be connected with village administration, in the direction of preventing obstruction to outflow by routes where there are vested interests, and getting finally rid of careless water-spread. Such matters would best be in the hands of the Sanitary Department, whose executive staffs should have sufficient sanitary engineering knowledge to estimate for and, in minor cases, execute necessary petty works in consultation with revenue officers ; leaving the major works to specially qualified engineers, such as the Public Works Department of India is richly provided with.

In connection with the complicated problem of drainage in combination with irrigation on village sites, BAIRD SMITH, as far back as 1855, in respect to the Punjab, suggested that the correct way to prevent petty opposition was to secure the influence of a co-operative system amongst agriculturists, which, as it happens, has already made a fair start in Bengal, and should therefore prove a useful ally to sanitation, in acquiring amongst cultivators a mutual regard for both public and private interests ; for, as Lord CARMICHAEL, Governor of Bengal, recently put the matter in a public speech, the question which is at the root of the malaria problem and irrigation, is not solely how to get water on to the ground, *but how to get it off*, after it has fulfilled its agricultural function.

"Jungle" and "Bush" Clearing, Drainage, or Both ?

In connexion with Bengal malaria, the question of efficacy of jungle clearing has arisen. In our tropical colonies Sanitary Officers appear to entertain no doubt as to the advantages of the method owing to exposure of concealed pools to sun action ; nor did GORGAS in Panama nor WATSON in the Malay States fail to use the method in this sense, as an adjunct to other malarial measures. The Government of Burma for many years made grants for "clearing of jungle" round Katha and Myitkyina, with good anti-malaria results. The following opinion was expressed by the Royal Commission (1859) on the "Sanitary state of the Army in India" (p. 169) :—"Nothing is more likely to prove advantageous to the climate of the Indian environment than the clearing away of jungle, the draining of useless swamps and an extensive cultivation of waste land."

Watson showed in 1911* that from the placing of coolies' barracks in open land at certain distances from undrained jungle very decided benefit resulted :—

Distance from jungle ..	300yds.	300-600yds.	600-1,000yds.	Over 1,000yds.	Total.
Number of children ..	325	396	532	1,042	2,295
Spleen Rate ..	47	21.9	11	2.6	14.2

FRY gives the following instance of inhabitants moving from jungle encompassed villages to open ground :—

† “An examination of spleen rates in these new hamlets produces some interesting facts. At the southern edge is a Mahomedan section of about thirty houses, which was built about twenty years ago. This is fully open to sun and air, but touches the jungle behind, and is close to the broken soil and tanks. The spleen rate is here 57 per cent. At a distance of 150 yards from this is a Hindu section of 40 houses. This is about five years old, and is absolutely free of vegetation. The spleen rate is 23 per cent. To the north is another hamlet of oil pressers. Seven years ago they moved bodily away and built a small village in the open at a distance of one mile, and though they still cultivate some of their own land they seem to have got completely away from the fever. The table below shows that spleen rate falls in direct proportion to the completeness of removal :—

25 children in old Oosta	Spleen rate 96 per cent.
17 “ of a village on edge	“ “ 59 “
19 “ “ 200 yards away	“ “ 23 “
12 “ “ 1 mile away	“ “ 0 “

The Bengal Drainage Committee in their Report on Malaria in Bengal, in 1907, quoted instances of drainage works which had been undertaken by Government in the Howrah District many years previously, and had undoubtedly been followed by improved health of the areas concerned, as contrasted with those neighbouring on them where no such measures had been undertaken, but they could only appeal to statistics showing decline of total mortality without differentiation as to malaria. Perhaps, however, the most recent testimony to the efficacy of surface and subsoil water relief (as an indirect effect of sewerage) is that referred to in the Calcutta Corporation Report 1909-'10. In that year, a syphon had been placed under Tolly's nullah with the result that, in the opinion of the Committee, it was “worthy of special note that in the areas in which the sewers had been completed, the morbidity from malaria had fallen considerably and health had greatly improved.”

In 1864, in giving evidence before the “Epidemic Committee,” Babu Degumba MITTER quoted a good instance in which the removal of obstructed surface drainage in the immediate neighbourhood of the village of Dwarbaswimy proved an effective anti-malarial measure. He said that the zemindar “at a cost of Rs.120 drained a bheel to the north-east of the village into a khal, and thus into the Kadernully River.” The zemindar thought that the “bheel would have a central pool which would not dry up after the drainage,” thus vindicating the Drainage Committee's subsequent classification of permanent and marshy bheels. This forecast was duly realized, and it is stated

*WATSON (Malcolm). The Prevention of Malaria in the Federated Malay States, 1911. Liverpool School of Trop. Med., p. 65.

† (Second Report on Malaria in Bengal, p. 16.)

"no fresh infection occurred." The sick "were only those . . . labouring under old fever and enlargement of the spleen induced by chronic disease." The chief official of the district of the period, Mr. MONTRESSOR, had used jungle clearing in the same area however, and was not disposed to let drainage have all the credit, so that he reported officially "the benefit that has resulted from these improvements in drainage though unquestionable has not been such as to induce me to attribute to defective drainage alone the prevalence of sickness at Dwarbaswimy." Those who espoused drainage were disposed to regard praise of jungle clearing at its expense as due to personal bias, but, in the present day, with knowledge of the mosquito as the transmitting agent of malaria, there can be no doubt that Degumbar Mitter, as reported by "The Hindu Patriot" (of 1874) was right in insisting upon the prime value of drainage, whilst Montessor was correct in holding that jungle clearing was an adjuvant; that is, that so long as there are pools of water suitable for mosquito breeding, "jungle" (using the term to include miscellaneous undergrowth) would impede the drying action of the sun, and would afford suitable day shelter and shade for mosquitoes bred in the pools. To suggest mere clearance of jungle from land so waterlogged that the sun's action is insufficient to secure rapid drying, is a procedure exceedingly feeble in proportion to expenditure involved. Indeed, all that may result, as has occurred in the experience of Mr. EVANS, Executive Engineer dealing with anti-malarial works in the neighbourhood of Kuala Lumpur, is an increase of anopheles of one species and decrease of another, presumably as a result of alteration of environment; a fact that would fit in with FRY's contrast of conditions in the South and North of the Howrah District, if he would admit that an area "more swampy and more jungle" has determining physical features.

Obviously, the necessary corollary of jungle clearing is evaporation, under increased sun action, of surplus moisture for mosquito breeding. A striking instance of the influence of dry ground, in the midst of the malarious areas of Burdwan, was thus reported by Mr. METCALF, I.C.S., in 1862. He stated that "Belam, in the Bood-Bood circle, stood in the midst of epidemic tracts with all its inhabitants healthy, no death, no chronic sickness, no misery; in every household the people breathing the same atmosphere as thousands of their fever-stricken fellow-creatures, and the sole perceptible difference is that the village is drier" ("The Hindu Patriot," 1872-'73).

In Bengal, according to Fry, the offer to clear the neighbourhood of villages of jungle has been met by agriculturists with either apathy or talk of compensation. In this the inhabitants must have reverted to the unpopularity of the measure in 1868, when the Government of Bengal reported to the Government of India that "no permanent good followed jungle clearing, as growth is just as luxurious two years after."

There are doubtless landlords open to secure jungle clearing not as a single measure but as a concomitant of drainage in Bengal villages, when, by a careful dissection of vested rights, the giving of compensation where this is just, and assigning special land for growth of fuel supply or other facilities, the villagers may be afforded ocular demonstration of the advantage of anti-malaria measures. In the

meantime, it is a somewhat remarkable fact that Hindu villagers, in their eagerness for gain by irrigation up to their doors, have forgotten the salutary requirement of Manu, which demands a zone for pasturage (not of miscellaneous "jungle") of 200 yards round a village and 600 yards round a town—a ruling of no small importance where malaria is rife.

Similarly, in the matter of planting trees for monetary gain (under the plea as reported by Fry that certain are "sacred") as well as in diverting or obstructing water-courses, which are factors in malaria prevalence, they forget the unsuitableness of persons who do such things to attend ritual feasts (Sradhas).

Silting in Malaria Prevention.

Sir Edward Buck has recently done good service in pointing to the importance of control of rivers bearing silt, and the advantages to agriculture of deposits so brought about. Dr. BENTLEY, in the interests of anti-malaria efforts in Bengal, carries this argument a step further. On recent delta land in Eastern Bengal, he pictures the absence of malaria and profitable agriculture amongst the healthy and increasing people, whereas, in Western and Central Bengal—the area of dead rivers with which we have dealt in a preceding note in this issue—he finds the absence of silt-laden water in a country protected from floods by artificial embankments and, in consequence, impoverished soil, malaria and a poor and dying people.* According to Dr. Bentley, therefore, the remedy is simple—flood the land with silt, and malaria will disappear, the land will bear rich crops, the people will be healthy and prosperous. Finally, in confirmation of his opinion, he appeals to the experience of Italy. As a sequel, it has been suggested that malaria experts from India should be deputed to Italy to report on the subject. As the Hon. East India Company placed on record in 1855 the results of their deputing Captain BAIRD SMITH, R.E. to Italy, on the same errand, and thus secured a marvellous amount of information as to irrigation in Italy, and its connection with malaria, there seems little reason for going again to that country for facts which have been placed at disposal, but have been little utilised in India up to date.

Now whilst pointing to the difference between delta land in the east of Bengal as a recent formation, and that of Western and Central Bengal as land advanced to the condition of dead rivers, Dr. Bentley refuses to see any physical difference except in absence of fresh deposit of silt in the latter. He ignores entirely the contrast of phases of change in surface and subsoil configuration influencing grades of relief of surface and subsoil waters which the Drainage Committee has put on record, and which we have utilized in the Note just referred to. Dr. Bentley assumes that the sole factor concerned is the silt.

Dr. Bentley produces no statistics to prove impoverishment of soil in the older part of the delta, but, admitting impoverishment, and also putting aside the number of days lost to labour by illness and death

* Proceedings of the 3rd All-India Sanitary Conference held at Lucknow, January 19th to 27th, 1914. Vol. 1, Discussions and Resolutions.—*Supplement to the Indian Journal of Medical Research*. 1914. Calcutta: Thacker, Spink & Co.

ceremonies caused by malaria, and apathy in labour, may not the contrast be more readily sought in the failure of the ryot on old established land—except unfortunately in the neighbourhood of drinking-water tanks—to return to it that which he and his cattle have taken from it. Thus Fry states:—"The entire population defecate in the open, and instead of going to cultivated fields they as often as not choose the banks of their drinking tanks. Cattle refuse is seldom removed to manure their fields, which is both wasteful and insanitary." That newly-formed delta land which has not been exhausted by bad agriculture may give better production than the older areas under these circumstances may be true enough, but that, as a corollary, the presence of dead rivers and other causes of insufficient drainage in old formations are negligible factors in the production of malaria and, therefore, of the impoverishment of a sickly population, cannot be reasonably pleaded. Further, success of this silt panacea scheme, either in agriculture or as an anti-malarial measure, would demand that flood protection embankments be abolished and silt laden water be allowed to flow indefinitely in delta land already formed as well as under formation.

The silt that Dr. Bentley would have us picture is an unvarying factor in quality and always suitable for agriculture. But a study of CLEMESHA's valuable work on the monsoon conditions on the Hooghly * shows that its quality and quantity are governed by many and variable factors affecting the rivers themselves and distance from the source of silt. In appealing to Italy, for instances of enrichment of the soil by its use for annual deposits on already formed agricultural land, the facts in support will be found scarce. Thus, the water from the Alps *en route* through Lombardy is freed absolutely of its silt by the chain of lakes of enormous depth which are found at the foot of the mountains, and seem none the worse for performing the function of silting reservoirs during many centuries. On the other hand, in Piedmont, in the absence of this system of natural deposit, according to Baird Smith, the fields at times receive a "fine grey sand deposit," which is a source both of worry to engineers regulating the canals and of loss to the agriculturists.

Far from dependence being placed on silt in Italy, it will be seen from the following quotation that, as elsewhere, the success of agriculture depends largely upon the discreet enrichment of the soil by manure.—

"The only great marsh in the Milanese proper is in the vicinity of Crema, between the Adda and the Serio. Throughout the Province of Mantua the soil is heavy and compact, necessitating the use of drainage as extensively as that of irrigation. In the Veronese it is very strong and light. In a word, the irrigated region is a great alluvial plain exhibiting the usual varieties of surface soil found in such formation, and enriched by an abundance of manure derived from the vast quantities of cattle which form the principal element of its prosperity. I have formerly mentioned, in illustration of this latter point, that within the triangle between Milan, Lodi and Pavia, it is calculated that there exists not less than 100,000 head of cattle, 25,000 horses, and 100,000 head of

*Proceedings 2nd All-India Sanitary Conference, Madras, November, 1912. Vol. 2. Hygiene, (1913 Simla: Govt. Central Branch Press).

smaller stock, as pigs, etc. **The whole of the manure supplied by which is applied to the enrichment of the soil.*"

That silting may be employed for reclamation of land, and thus render mere marshes valuable for subsequent agriculture, and that in the processes incident to land thus cultivated antimalarial measures will result automatically, is a well-known fact and has excellent illustration in Italy and Great Britain. Thus Baird-Smith reports of the Val di Chianna :—

"For a length of nearly 60 miles (the valley) had been reduced to the most frightful state of unhealthiness and depopulation by malarious influence" The whole of the works had been finished for some time and with the most remarkable results, the entire valley having been restored to culture occupied by an industrious and more healthy population, with the low, marshy localities all filled up and the waters now under perfect control."

But such instances are not to be confused with using silt-laden water by haphazard annual instalments over large areas of country, as a panacea for both soil impoverishment and malaria prevalence. Instances may be quoted to show that flooding and deposit of silt have resulted in improved agriculture and, temporarily, in less malaria. This is conceivable as a result of flushing of pools and silting of shallow pits; but nothing short of complete and careful regulation of the deposit as received in individual fields and persevering drainage of the country treated, including a full system for removal of water from the country after leaving its deposit, would secure fully favourable results, and this solely in deltas still under formation. Up to date of Baird-Smith's report, silting of the unhealthy marsh land of Grosseto had proceeded for over twenty-three years at a cost of £60,000, and he estimated that a further expenditure of £150,000 would be necessary. In England, silting has been in use since 1846 for reclamation at the mouth of the Ouse, but only 2,500 acres have so far been recovered. Whilst silting, therefore, must be of great value under certain conditions, it is not a panacea; nor is the process instantaneous or automatic, and therefore free of financial effort. Dr. Bentley's paper should, however, do good in drawing public attention in Bengal to the long established truism of the close connection between *well-conducted* agriculture and anti-malaria measures.

Mosquito Nets.

In the Section of the Report of the Sanitary Commissioner with the Government of India for 1912, which is communicated by the Director, Medical Services, it is stated :—

"Until the use of mosquito nets by troops is general, it is unlikely that we shall obtain any great reduction in malaria prevalence. The Government of India have definitely decided to incur no expense in providing nets for soldiers other than a few selected places, the provision, therefore, of these protectors for the men, depends entirely upon regimental initiative. We are able to record a slow but steady increase of the use of nets by soldiers in barracks. Many are provided regimentally and a few are private purchases by the men themselves. There has been no abatement of active antimalarial measures in all garrisons by means of mosquito brigades. Concurrent with these activities, the administration of quinine has been steadily pressed and the combined influence of both these measures is slowly bearing fruit."

*Italics not in the original.

"Stoppages" are not popular with British troops but, putting aside this and the financial decision of the Government of India, the utility of mosquito nets as an anti-malaria measure has made more progress with Indian sepoys in Burma. Here in 1909, amongst 15,721 Military Police, 12,303 men had voluntarily provided themselves with mosquito nets, at their own expense.

Anti-Malaria Work in Singapore.

The Straits Settlements, of which Singapore is the chief town, comprise 1,599 square miles, having a population of 728,635. Of this number, 7,500 are Europeans, the bulk of orientals forming the remainder being Chinese and Malays. 39,969 labourers are employed on estates. The spleen rate for children in Singapore is 27.2 per cent., Penang 11 per cent., Malacca 70.3 per cent. In the interest of efficiency both of the labouring and town population, the necessity for anti-malarial measures is therefore evident. These are being conducted with activity and excellent care as to details, whilst the economy in their execution is very striking. The reporting officer suggests after careful dissection of available evidence that quite 45 per cent. of total cases of malaria are imported, but holds that the question as to the precise extent of endemic malaria in Singapore must remain an open question, in view of the very large proportion of the floating population. He states:—"As a result of the erroneous, sometimes conflicting, statements with which one has to deal, even the mind and the energies of such an eminent biometrician as Karl PEARSON would be overtaxed to elaborate a formula which would give the ratio between endemic and imported malarial cases." But at least the local authorities seem resolved, by using the radical measure of drainage, to leave no removable cause of endemic malaria.

The locality has been inspected by Dr. Malcolm WATSON, and hence the method of eradicating larvae spots from ravines has a family likeness to those successfully inaugurated by him in the Federated Malay States. Jungle has been cleared, marshes drained and ravines have been regulated and canalized, and subsoil drained. Each such work must necessarily have its own problem to solve, in which modifications of general principles must be employed. Here is one as stated in the Report, page 26:—

"Why the railway cuttings and such situations as MacKenzie Road, Mount Wallich, etc., have been selected, is due to the fact that, in excavating the soil, certain springs have been tapped which afford a continuous supply of clear water even in dry weather. The problem remains, how can one abolish such a flow? By piping, broken stone, or coral drains, covered by a layer of impervious soil to allow storm water to run over and inhibit silting? Great difficulty seems to arise in the construction of such a drain as will take away a slight flow, and not silt up rapidly. Granted, however, that such a drain does silt up comparatively quickly, I maintain that it is better to construct such and reduce the number of malarial carriers in all these situations, even though the drain has to be dug up, cleaned and reconstructed at intervals of some months, or mayhap years, when it becomes inefficient."

What is apparently required is a subsoil intercepting drain of agricultural tiles at right angles to the subsoil flow, and the chances are that if silting is, from the nature of the subsoil, specially dreaded, the system of open joints protected by loose gravel will give the best

results. Subsoil tile drains carefully laid afford good co-operation in duty, and granted a unit is put out of action there are always comrades within reach to take it up, so that this problem, we have no doubt, will be solved by local experience of results increasing faith in good work. Another difficulty alluded to is the scouring effect of flood water in ravines in exposing subsoil pipes. This certainly cannot be met by any uniform measures, and we think the methods adopted by Mr. EVANS, the Engineer to the Federated Malay States Malaria Advisory Board at Kuala Lumpur, are peculiarly advantageous.

Larvae-eating Fish.

The Anti-Malarial Committee, Singapore (R. J. FARRER, Hon. Secretary) in their report for 1913 state that in a "shallow running ditch overgrown with weeds and other vegetation, larvae of *N. rossi* and *M. sinensis* are breeding out in enormous numbers, in spite of the fact that three types of larvae-eating fish are present in abundance:—*Haplochilus panchax* (vernacular—Ikan mata lalat), *Hemirhamphus fluviatilis* (Ikan julong julong), *Ophiocephalus striatus* (Ikan aruan)."

The subject of selection of suitable larvae-eating fish in India is being studied in the Bombay Bacteriological Laboratory. The matter certainly requires elucidation, as although there are plenty of voracious mosquito larvae eaters, it is necessary to distinguish those which in adolescence become strict vegetarians; and, again, the fish who do not scruple to eat their larvae-eating brethren must be excluded. The verdict founded upon special observation may well be awaited, but if the *Chela argentea* (Chel-hul, Roochal, or "Havildars and twelve") acts up to its reputation, it should prove both a good larva and adult mosquito enemy, whilst being a fish of beauty and decidedly edible.

Mr. Wilson, Piscicultural Expert, Madras, has afforded the following opinion to the Sanitary Commissioner of that Presidency (G. O. No. 2409M, dated 16th Dec. 1912):—"It is advisable to stock different classes of water with different classes of fish, viz.—For tanks, swamps, and village ponds—*Chela*; for wells, channels and stagnant pools—*Haplochilus*; for backwaters, salt and brackish swamps and pools near the coast (these fish can also be used in fresh-water ponds)—*Therapon jarbua*."

As was stated in No. 7, Vol. 3 of this *Bulletin*, much good work was done in this direction by the late Mr. H. THOMAS, I.C.S., as described in his "Rod in India." He studied pisciculture from an economic point of view, and protested energetically against the wholesale destruction of fish fry which occurs at the hands of villagers in irrigation channels as a waste of food sources. With him each village tank would have been converted into a place of food production, and hence he advised legislation for the protection of fry. The whole of the methods by which he would support his recommendations are simple in the extreme, and depended largely upon automatic means of allowing very small fry to escape to the river whence they were derived.

He calculated "from a very low average of the number of fry contained in 50 acres, this area must contain in all probability considerably more, and certainly not less, than 283,500,000 of diminutive fry," which if not destroyed "would represent at least at fair growth 253,125 tons of good food."

In judging the causes of freedom of malaria of certain areas under irrigation, obviously the question of the action of large armies of fish must not be forgotten, and the extent in certain areas to which their premature death is compassed by agriculturists. Time honoured rights of cultivators to destroy fish would doubtless require gentle handling, but economic pisciculture and malaria prevention would in this be hand in hand, and in parts of India the aid of the co-operation movement might be secured. The problem demands that before an agriculturist receives a flow of water on his land he shall so arrange that after use its surplus shall be conducted to correctly graded drainage channels; for whilst to allow water from irrigated fields to collect in pools is to harbour mosquito larvae, their drying up means death to the stranded fish fry.

DARLING'S Larvicide.

In the *American Journal of Public Health* of February, 1912, Dr. DARLING, of the Chief Board of Health Laboratories, Ancon, published results obtained with the larvicide he had devised. Crude carbolic acid of a specific gravity not above 0.97, and containing 15 per cent. of tar acids, is heated in an iron tank by means of a steam coil under 50 lbs. pressure. Into 150 gals. of this, 200 lb. of crushed and sifted common rosin are introduced by stirring and, subsequently, 30 lb. caustic soda dissolved in 6 gals. of water. These amounts will yield about $3\frac{1}{2}$ barrels of larvicide. He claims that as a bactericide this has an R.W. co-efficient of from 2 to 5, when tested with *B. typhosus*. When using it as a larvicide, he employs one part to five of water and distributes it by spray. This affords a milky opalescence representing approximately a dilution of 1 in 5,000.

On the Panama Canal at the period of Dr. Darling's Report on this subject, 250 barrels of the larvicide were being used per month. Darling states that in a dilution of 1 to 5,000 anopheline larvae die in five minutes, culex larvae in three minutes, and that it is destructive not only of larvae but also of algae and protozoa. It is evident, therefore, that the preparation has a wide sphere of utility.

Darling's experiments, however, disclose the fact that, whilst larvae readily died, pupae exhibited considerable resistance. But he overcomes this possible objection by showing that the typical anopheline of the locality (the *A. albimanus*) has an egg stage of two days, larval of nine and pupal two; so that the ordinary ruling as to application of a larvicide every seventh day will effectually prevent breeding.

Darling recognized that in contact with algae and protozoa exhaustion of the killing power of his larvicide might result, and he quotes CHICK and MARTIN's experiments with emulsions of tar acids showing that the first action is that of absorption, and not a chemical combination. He, however, was able to demonstrate that the efficiency of the larvicide in contact with algae lasts "for at least seven days and certainly longer," and that when it is in contact with algae for a period of 1 to 7 days, 70 per cent. of the larvae are destroyed within 48 hours.

The question having arisen as to whether in Sierra Leone this larvicide would be equally effective as well as cheaper than kerosene oil, the officer in charge of the laboratory (Dr. Young) made a series of

experiments on the subject. He confirmed Darling's finding that pupae show resistance, and verified the destructive power upon larvae. No experiments were made as to influence upon algae, which necessarily would be a point of importance in differentiating the merits of larvicides. The officer condemned Darling's larvicide, firstly, on the admitted fact as to pupae, and secondly, on the ground that although the larvicide would cost but sevenpence against tenpence per gallon for kerosene, the measurement of the former, in practice, would be by volume of water treated, against the superficial measurement of the spread of kerosene. He makes no deduction as to rate of evaporation in the cost of kerosene. In coming to this conclusion, however, it seems to us he has ignored Darling's definition of the constituents of his larvicide, which runs as follows:—The specific gravity should be "not greater than 0.97 and contain not less than 15 per cent. tar acids. Each consignment of crude carbolic acid is assayed at the laboratory to determine its specific gravity and percentage of tar acids, for it is necessary to keep the product of a specific gravity approximately that of water, so that it will diffuse rapidly and neither sink to the bottom nor remain on the surface." (Italics not in the original.) Of course, although this is not stated, it is possible the larvicide was carefully tested by the officer conducting the experiments, and fulfilled requirements in these respects; but, granting this was so, it was obvious that whilst his tests were of utility as a contrast with kerosene, the actual experiments with the larvicide were but a verification of Darling's own results with solutions up to a single strength. The test necessary is to ascertain whether these dilutions are obtainable in nature as a result of spraying pools; and it seems to the writer that the only way this could be gauged would be by securing specimens of strata of water at different depths and at different times in pools which had been sprayed, and with solutions so obtained ascertaining the effects upon larvae. In the meantime, Darling's experiments must be regarded as of a convincing nature.

Are Larvicides inimical to Other Forms of Animal Life?

It would appear that the practice of treating ponds and other natural collections of water with petroleum and disinfectants for the purpose of destroying mosquito-larvae has aroused considerable opposition in Germany from naturalists and other lovers of nature. It has been asserted that such procedures necessarily destroy fishes and other feeders upon mosquito-larvae so as to do more harm than good in the long run, and it is said that birds and other wild animals are thereby deprived of their natural drinking-water, or are actually poisoned. The microscopic fauna and flora of such bodies of water are also said to be necessarily destroyed.

In order to test the truth of these allegations, ROST* and SCHUBERG†

*ROST (E.). Zur Kenntnis der Wirkungen kresolhaltiger Desinfektionsmittel (Saprol, Lysol, Kreolin) und des Petroleums bei Tieren. [A Contribution to our Knowledge of the Action of Cresol-containing disinfectants and Petroleum upon Animals.]—*Arbeit. a. d. Kaiserl. Gesundheitsamte*. 1914. Mar. Vol. 47. No. 2, pp. 240-251.

†SCHUBERG (A.). Naturschutz und Mückenbekämpfung. Versuche über die Einwirkung zur Vernichtung von Mückenlarven dienender Flüssigkeiten auf Wassertiere und Vögel. [Animal Protection and Destruction of Mosquitoes].—*Ibid.* pp. 252-290.

[Summarised by Dr. J. B. NIAS].

jointly undertook to investigate the question. Rost tested the action of petroleum and cresol-containing disinfectants upon laboratory animals, such as dogs and guinea-pigs, while Schuberg tried the same substance upon fishes, tadpoles and microscopic crustacea kept in aquaria. The effect of adding the same substances to the drinking-water of cage-birds was also investigated.

Briefly the authors' conclusions are as follows :—

1. The toxic action of Saprol, Lysol and similar cresol-containing disinfectants depends upon the amount of cresol which they contain.
2. There appears to be no such thing as chronic cresol-poisoning. A succession of non-lethal doses administered to an animal produces no ulterior effect.
3. Commercial petroleum is but slightly toxic, even in large doses, to laboratory animals. It produces only slight narcotism.
4. Petroleum, when extended upon the surface of water, gives off no products which can contaminate the subjacent liquid by diffusion. It suffocates mosquito larvae mechanically, by preventing them from taking in air at the surface. It has no effect upon fishes or other animals which breathe by means of gills, provided that the water contains enough vegetation to furnish the requisite oxygen. The same may be said of microscopic pond-life.
5. In the proportions commonly used for the destruction of mosquito-larvae, the cresol-containing disinfectants are not noxious to the higher forms of animal life, such as fishes and other destroyers of mosquito larvae; and as regards the microscopic forms of pond-life, their reproduction is so rapid that the application of such disinfectants during a limited period can do but little permanent harm.
6. Birds do not refuse to drink from water spread with a thin film of petroleum, or containing cresol-disinfectants in the ordinary proportions used.
7. The fears of naturalists are therefore not considered justified.

YELLOW FEVER.

Stegomyia Traps.

A trap for *stegomyia* is suggested by Captain HORNE, I.M.S., Special Malaria Officer, Madras, in the following terms* :—

"In view of the conditions that maintain in the large Indian towns, it cannot be expected that all breeding places of *Stegomyia fasciata* will be wiped out by anti-mosquito measures. A few will remain and continue to breed out adult *stegomyiae*. These adults finding their ordinary breeding places very scanty, will have a tendency to seek out others that are difficult of discovery and access. It is to prevent this that the traps are used.

Ordinary earthenware gurrabs are most suitable for the purpose: they are kept half filled with water and emptied once a week. All eggs laid in these and larvae that have developed from them will thus be got rid of every week, and the output of survivors greatly reduced.

They should be used in sets of three, only in authorized places (police stations, post offices or factory yards, etc.) in areas where the *stegomyia* is most in evidence in spite of anti-mosquito measures. Thorough control is of course absolutely essential; otherwise they will do more harm than good."

The following is a trap suggested by Major S. P. JAMES, I.M.S., in his recent paper "Mosquito work in Ceylon," read before the Society

* Madras G.O. No. 127 Pub. 28 Jan. 1904.

of Tropical Medicine and Hygiene. The idea of using trapping extensively in aid of mosquito reduction he ascribes to Mr. HOWLETT, Imperial Entomologist, Government of India :—

“One of the traps that we have found most successful consists of a rectangular wood framework, 5 feet long, 3 feet deep and 3 feet broad, closed with mosquito netting, one end of the trap being a door on hinges. We place these traps on the ground in the shady corner of a garden, and cover them with sacking and a thick tarpaulin, so that the interior is dark and cool. Two or three pots of plants are put inside each trap and several near the door, which is left partly open. Our second picture shews one of the traps set in the manner described. We set the traps overnight, and the next morning, about nine o'clock, we send beaters through the vegetation in the neighbourhood of the traps, and we burn straw torches in all the surrounding buildings so as to drive the mosquitos into the open air. The result is that most of them quickly find their way into the traps, which appear to them to be very attractive and cool resting-places. After completing the disturbance of vegetation and the smoking of surrounding buildings we close the door of the trap, and collect and count the imprisoned mosquitos.”*

PLAGUE.

Plague in Mauritius.

During 1912, there were 656 cases of plague with a mortality of 82·5 per cent. The epidemic was a continuation of that of 1911, there being only 14 days freedom of cases throughout the year. Of the total 44 were pneumonic, 7 septicaemic, and 27 abubonic cases. In his Report on the latter the Director of the Health and Medical Department (Dr. R. DENMAN) states: “The fatality which attended them is responsible for the very high death-rate for plague this year.” 414 persons on one of the infected estates were inoculated with Haffkine's vaccine. The total number of cases was 13 with 10 deaths. Of the latter three had been inoculated 15 days previously.

Plague in Mombasa.

Plague is surely but steadily putting at defiance various theories of “immunity” of localities. Ceylon is a recent case in point. Mombasa also lost its fame in this respect, on the 28th August, 1912. A group of four deaths from pneumonic plague first brought the disease to notice. Finally, it became known that 13 members of one household, who had either lived in the infected house and tended the sick, or visited them, had succumbed to plague. The rats in the house when pneumonic cases were first found were infected. No mention of the occurrence of bubonic cases is made in the Report, and the relation of rat infection to the outbreak cannot be traced. The local authorities had difficulty in dealing with concealment of cases by Indans.

Plague in Ceylon.

It will be remembered that, at its origin, plague in this locality was exclusively septicaemic, and that, gradually, bubonic cases appeared. Accounts received up to 15th June—in so far as the types have been

* Horne's method aims at a massacre of the innocents, James's at outwitting the wily and expectant mother. A combination of the methods should be useful in practice.

differentiated—show that the septicaemic form still predominates, although the bubonic is steadily asserting itself. Thus, whilst from the 25th January to the 26th February, in 46 cases there were only nine cases which were bubonic, from the 25th March to the 15th June, in differentiated cases, there were 36 septicaemic to 29 bubonic. In new centres of human infection, Symond's Road and Forbes Road, in spite of diligent and special search—in the latter case in front of plague advance—no infected rats were found till the 14th June and 22nd June, respectively. In the former locality the first person found infected was a "latrine woman" on the 20th April: by the 15th May five other cases occurred—the first being on the 5th May—and between this date and the 23rd May there were two other cases.

The epizootic is spreading slowly. In infected localities, infection of rats examined have varied from 1·9 to 4·6 per cent. The *M. norvegicus* and *M. rattus* appear fairly well to divide the onus of infection—there being about 33 of the former to 30 of the latter. One rat is reported as an instance of septicaemic plague. 17 persons died in Hospital as plague subjects, but bacteriological examination failed to discover the *B. pestis*.

In a village four miles from Colombo, between the 22nd of February and the 5th of March, six persons died of plague in one house. The source of infection was traced to an infected locality in Colombo. In this case the type of plague is not stated, and no suggestion is made of rat infection.

Rats.

Before it is possible to excogitate a successful method of rat-proofing a building, it is essential that the extent to which they can pass obstructions be ascertained. Asst. Surgeon CREEL,* United States Health Service, has made serviceable experiments on this subject.

As to their swimming powers, he found that a *Mus norvegicus* released 450 feet from the shore reached land in six minutes; another released 1,300 feet from land swam a total of 1,500 feet and reached shore in 55 minutes.

When confined within a stockade made of galvanized iron, sunk 3 feet into the ground, they burrowed $2\frac{1}{2}$ feet into the soil. Usually, the depth of a burrow does not exceed $1\frac{1}{2}$ feet, but "burrows have been noticed passing beneath walls of two feet depth." Confined in a stockade they climbed a tree; also a one-inch pipe. They are capable of jumping 17 inches upwards or outwards.

The *Mus rattus* and *alexandrinus* released 1,500 feet from shore failed to reach it, having apparently no sense of direction, but kept afloat for 45 and 55 minutes, respectively. They do not burrow, but hide themselves behind any convenient article or projection. A specimen, presumably a hybrid, made a hollow in the ground in which it hid, but did not burrow. According to the Dutch in Java, the hollow bamboos in buildings are favourite places for nesting. Both the *Mus rattus* and *alexandrinus* climb well, and are capable of jumping

* CREEL (R. H.). The Rat. Its Habits and their Relation to Anti-plague Measures.—U.S. Public Health Reports, 1913, Vol. 28, Pt. 1. pp. 383-386.

upwards two feet; and in one instance a *Mus rattus* confined within a perfectly smooth galvanized garbage bin of 24 inches depth "by a series of jumps spiralled its way to the top of can and escaped." He found that the *Mus norvegicus* will pass through the hardest ground: they can pierce the body of sun-dried brick, but usually the hole is made through bad joints of lime mortar. He discredits the Indian Plague Commission's statement that rats pass through concrete, but it is probable that the American "concrete" he refers to is made with cement instead of, as is more common in India, lime: indeed, we find from consultation of a good American Dictionary the usual acceptance of the word "concrete" is the form made with cement.

On referring to pp. 771-772 of *Journal of Hygiene*, Vol. 7, No. 3, it is found that the Commission states that both the floors and walls of houses are riddled with the holes and burrows of *Mus decumanus* and *Mus rattus*. The walls are described as of burnt brick and mortar, whilst both the immediate outer and inner surfaces of the walls are plastered with lime.

The further evidence of the Indian Plague Commission on the subject of rat habits also shows that these may be modified by environment. At pp. 746-748 of the same volume they state that the *Mus rattus*, though typically a climbing rat, is able to burrow into a beaten-earth floor. *Mus decumanus* "is a burrowing animal with remarkable powers for gnawing through hard material, e.g. brick and concrete, but it is also a good climber." The *Mus decumanus* at Bombay is to a certain extent a house rat. "Extensive burrows" by this rat were found in the chunam [lime] floor of a living room and also in a second floor of an office.

Before proceeding to make rules as to rat-proofing of buildings, a conference of officers of the Public Works Department in Burma made experiments in 1910. As a result, they stated as follows:—"Rats can jump two and half feet; can climb any vertical surface which is not smooth, dense, and hard; can surmount any horizontal projection of less than six inches, if the material be such as they can climb on a vertical surface; and can walk along a thin suspended wire."

Asst. Surgeon Creel states that, under natural conditions, the *Mus rattus* and *alexandrinus* will climb coconut trees of any height, drain pipes and wires, and get from one building to another by passing over wires.

The following deduction by a former Sanitary Commissioner with the Government of Madras (W. G. KING) (Report embodied in G.O. No. 1989, dated 27th January 1904) may also be of some value as to rat habits in reference to epidemiology:

"Even in the midst of an epidemic, although undoubtedly they are a serious source of spread of infection amongst the free population, the area over which infected rats operate in a town is very limited. Possibly rats, as in the case of monkeys, form separate tribes, which have their own limited territory, recognized by inter-tribal agreement, so that there is little intermingling of rats of various areas in the town. Even when we come to the question of migration, the rats only of a limited portion of the town are invariably involved."

Prof. BOYCOTT* has placed on record the fact that in two localities

* *Guy's Hospital Gazette*, 1911. Vol. 25, pp. 73, 318.

distant only 100 yards from each other, the fleas infecting rats were markedly different. Thus, as summarized at p. 9, *Journal of Hygiene*, Vol. 11, Supplement I, Sixth Report on Plague Investigations in India, "in locality A, 94 per cent. were *C. fasciatus*, while in locality B, 97 per cent. were *X. cheopis*. In all 24 rats yielded 457 fleas, an average of 19 fleas per rat." Although aware this evidence is not conclusive, he considers it suggestive of tribal habits, in that intimate inter-communication was improbable.

The moral is, prompt action against rats on the first sign of an epizootic; especially that adopted by the Japanese of surrounding suspected dwellings by corrugated iron sunk in the ground and sufficiently high above it to prevent escape either by burrowing or climbing.

Rat Destruction.

According to Major C. E. SOUTHON, I.M.S.,* Chief Plague Medical Officer, Punjab, a simple method of rat destruction has been lately used largely in the Punjab, which is carried out by means of the so-called "smoke stove." He states:—

"Smoke is generated in a cylinder, using straw or any other cheap substance which will produce acrid smoke, and this is forced down rat holes by means of bellows. Exit holes are closed and rats are quickly suffocated. Sulphur is also sometimes added to the straw, and the fumes produced cause very rapid death, not only of the rat, but also of the fleas on it. From our present knowledge it would appear that this method is very suitable to towns, especially those which are well built, and where the rat population is to be found on the floor level and under it. It is not quite so efficacious in thatched or tiled villages where rats live on the roof level. At the same time it would appear from certain experiments that the smoking of a village on one occasion, that is one or two day's work, is equivalent in result to the trapping of that village for one month. A combination of the two methods would certainly prove of great value. The advantages of this method are that it is cheap, rapid, kills both the flea and the rat, and moreover the rat has no say in the matter, and most important of all it offends no religious prejudice. The disadvantages are that very careful and reliable supervision is needed, and it is not so adaptable to villages."

This is really an adaptation of a method much employed by Indians to get rid of bandicoots. They bore a hole in an earthen water vessel (chatty or gurra), partially fill it with easily combustible rubbish, drop in a piece of live charcoal, place the narrow mouth of the vessel over the entrance of a burrow, adapted by a little clay surrounding it, and by adjusting their lips to the hole, manage to produce a lively draught by blowing. They aid the resolve of the animals in a burrow to bolt or die by adding chillies to the burning mass, and thus produce fumes irritating alike to the eyes and respiratory passages. The writer first saw this method used for anti-plague purposes in 1907 by Major C. E. WILLIAMS, Sanitary Commissioner for Burma, who replaced the earthen chatty by a kerosene tin, to which he attached a flexible tube, and the expiratory efforts of human beings by a bellows.

* Report on the Sanitary Administration of the Punjab, 1912; Punjab Government Press.

The Madras Plague Prevention System.

In their Order No. 218 P, dated 31st March, 1914, the Government of Madras have directed, subsequent to June 1st of this year, that certain changes in their method of combating plague shall be effected. The present system has been in use with but little modification since September 1896, when plague was first declared to exist in Bombay. Descriptions of the method in current sanitary literature, from time to time, have erroneously assigned its chief peculiarity as a segregation of contacts and patients coupled with surveillance of populations. In connection with the comparative immunity of the Presidency of Madras under this system compared with the rest of India, it has been sought to prove that this organization has had little or nothing to do with the results, and that still undiscovered natural features account for the difference in plague spread. In view of its present modification, therefore, it may be of interest to epidemiologists to sketch the chief peculiarities of what was the first complete organization against plague in the present pandemic, throughout both rural and urban areas, in a total of 143,000 square miles, containing a population of, at the present day, 41½ millions.

The first line of defence was the formation of a system by which it was possible to trace movements of persons from infected foreign territory, as well as from within the territory guarded if it became infected. It was required that all persons arriving or departing from an infected area should receive a passport declaring their destination. Of this form a duplicate was forwarded to an appointed authority at the proposed destination, this being the first point of arrival on a journey, whilst a triplicate was recorded locally. A series of rulings enabled authorities to serve passports upon persons attempting evasion, known or suspected to be recent arrivals from an infected locality. All authorities were kept informed of the position of these infected localities. A passport holder was free to move from place to place; but if he stayed in any locality over twelve hours, he was bound to report himself once daily for health surveillance. This was originally maintained during ten, and latterly, seven days. *The whole system was a protest against quarantine or segregation.* Segregation of particularly untrustworthy "contacts" could be enforced at local discretion, but contacts of ordinary character could *not* be segregated after the incidence of three indigenous cases, in the locality concerned, had suggested epidemic prevalence. After disinfection they were free, but were required to reside in approved residences in the neighbourhood of the infected area. They were then required to subject themselves to surveillance daily. Contacts and their property were however allowed to leave infected areas if and when they exchanged local surveillance "passes" for "passports," after disinfection of all clothing and property *immediately before* departure from the area concerned, and on production of a certificate from a member of the sanitary staff that this had been accomplished.

Subject to local discretion, compulsory segregation of patients was advised as to the first three indigenous cases and of all imported cases, but beyond this local authorities treated patients under ordinary principles as to suitability of accommodation, especially in regard to

pneumonic cases. Segregation, therefore, was but a very limited factor, except in respect to imported plague patients.

In all threatened areas a campaign against rats was ordered, and technically trained sanitary staffs were retained in so-called "observation circles," in both rural and urban areas, in proportion to area and population. These staffs were uniformly placed in advance of plague progress—a matter rendered largely possible by information obtained from the amount and direction of exodus from infected areas, as shown by passports. Not only were steps taken to observe the person holding the passport, but "notification of disease," which is now solely to be relied upon, was also legally enforced in the event of an occurrence in the house visited by a passport holder, thus, "any case of illness or death in the house in which such passport holder is, or has been residing, shall forthwith be reported to the nearest plague officer,"* etc., etc. Reports of all imported cases in uninfected areas reached local civil and sanitary authorities, the Government and their Sanitary Commissioner, by telegram. Full histories of the first three indigenous cases were supplied within 24 hours to the Government, through the Sanitary Commissioner.

The rat as a "conveyor of disease" and its killing as a "precautionary measure" in advance of plague was duly officially recognized in September, 1896 and November, 1896, respectively.† The importance of maintaining observation circles in recently infected areas during the following hot season, which is now being advised as a prominent precaution in plague measures in India generally, was also officially recognized (Madras G.O. No. 7950, dated 16th May, 1902), and was re-affirmed by the Government in paragraph 7, G.O. No. 272P, dated 6th March, 1903. In an organization where staffs were ever pushed in front of plague advance and information in detail was promptly forthcoming, it was concluded *ordinarily* (as a result not of predilection but of careful enquiry) that a rat epizootic in newly-infected areas represented a failure of sanitary precaution as to the more frequent traveller of distances, namely, man, and rat plague was therefore most carefully watched for and was met in the spirit of temporary defeat accordingly, by using prompt evacuation and inoculation. Grain as a recognized rat carrier was dealt with by destruction of small quantities as found in households, and by strict disinfection by sunlight, and lapse of time, of large stores within infected areas. Although SIMOND's flea theory was acted upon by executive sanitary staffs subsequent to 1898, the system lacked the advantage of the important knowledge gained by the Indian Plague Investigation Committee as to scope of flea infection, but knowledge as obtained from time to time was readily adaptable to the whole system, without in any way disturbing the main features of the organization. Indeed, no greater alteration of Madras Plague Regulations than the use of a pulicide as well as a germicide in disinfection was requisite. So that, in throwing away a portion of the system, whose chief value was the linking of official and non-official measures so as to gain prompt and accurate intelligence against disease spread, the rest of the organization remains but little touched.

*Madras Plague Regulations. Part I, Rule 7.

†On deductions from Reports as to the disease in Gharwal and Hongkong.

After careful consideration of the present position of affairs the Government of Madras has restricted attempts to watch movements of travellers by land from infected areas to travellers by rail, and will trust entirely to the system of observation circles in the case of travellers by road or river, and abolish rules under which arrivals are bound to place themselves personally under surveillance for a period of one week at their destination. These particular travellers will be required to receive a document which enforces notification. It remains to be seen whether the new system can equally secure prompt intelligence.

The important part on the new basis will be that "observation circles" instead of being (for financial reasons) thrown out solely over threatened areas, as hitherto, will be maintained permanently in all parts of the Presidency neighbouring foreign territory, where plague has become indigenous for a prolonged period, namely, in Mysore, Bombay and Hyderabad. This implies a further advance in the organization of a permanently executive sanitary staff for routine service in rural areas, as plague prevention will not alone receive attention.

A former Sanitary Commissioner (W. G. King), after holding that precipitate withdrawal of temporary plague staffs during hot weather was the real cause of so-called "recrudescence," stated (Madras G.O. No. 198P, dated 27th February, 1904) "the moral is (and I speak only for conditions in this Presidency) that given correctly trained staffs employed in numbers sufficiently large to keep the population under surveillance during the whole year and not solely during the cold season, plague could be confined to imported cases received from foreign territory." If the permanent staffs fulfil the requirement of being "sufficiently large," this theory will receive a test.

Under the old passport rules, the onus of reporting sickness rested with the householder, medical practitioners and local authorities, under various sections of the Plague Regulations, but under the new "notification system," this responsibility is thrown upon the traveller. The form is as follows:—"I of proceeding to do hereby bind myself to deliver this notification to the Local Authority of that place on my arrival, and to report to him any case of fever or plague or of unusual mortality among rats in the house occupied by me within a period of one month after my arrival." Having regard to the text of this notification, it does not seem that there is any desire to ascertain the condition of houses visited by apparently healthy travellers (and perhaps flea bearers) *en route* from place to place, which was possible under the old ruling we have quoted; presumably, the authorities will be content hereafter to receive information from persons after their arrival at an *ultimate* destination, as it can hardly be intended that the person responsible is to be allowed to delay notifying events following his presence in a house to any period that may be convenient to him, provided it be within one month of his arrival.

BERIBERI. "Cured" Rice.

It is a popular fallacy that "cured rice" is that generally employed by Indians. On the contrary, its use is confined to very small sections of such few as employ rice (in comparison with users of the cheaper dry grains); ordinarily, these employ rice made free of husk by hand-pounding and winnowing. Again, with some, "Burma rice" implies that all Burmans eat mill-polished rice. This is not the case; although Burmans in urban areas may employ it, the typical Burman of rural areas and all jail prisoners use simple "husked" (decorticated) paddy. Again, the ordinary idea of cured rice is that there is involved a process of "parboiling" which may help to preserve it from deterioration. This may incidentally be so, but the Indian secures changes in the grain, before the boiling which gives it peculiar flavours, and it is to secure these that the processes are carried out. This is evident from the following extract from an official Report by the writer (1904) on inspecting the trade process:—"Paddy is soaked in cold water in large earthenware tubs, for a period of 48 hours for the inferior varieties of grain and 24 hours for the superior, until a certain grade of fermentation is obtained. It is then placed in chatties over a fire, until a temperature of 212° F. is obtained. This effectually checks fermentation* of the now bulky grain and, presumably, kills all non-sporing germs that may have been acquired during contact in the process of soakage with the undesirable quality of water to which I later on allude. The grain is then placed upon the platforms of brick to dry and cool. The process of paddy-boiling probably produces saccharine matters that are tasteful to the consumers and represent a stage in the process of change of starch that may, as claimed by all who use such rice, aid digestion. But, as pointed out in special reports written by me in 1882 and 1891, the use of a grain rendered artificially bulky means less nutriment for the consumer who buys by measurement."

The Phosphorus Pentoxide Contents of Rice Pericarp.

The following extract given by Dr. HEISER in his paper on beriberi in the *Medical Record*† should prove very useful as an approximate test of extent of pericarp destruction in rice:—"Any rice that stains deeply with Loeffler's methylene blue or Churchill's tincture of iodine, contains less than 0.4 per cent. of P_2O_5 and a rice that stains only slightly contains more than 0.4 per cent. of P_2O_5 ."

Polished Rice.

If the influence of moulds on rice is to be studied, a knowledge of its chemical composition will probably be required besides that of the pericarp which hitherto has had, on good ground, the first attention. As there are about 160 varieties of rice and endless qualities, it is to be hoped that information as to the pericarp will suffice; but, Mr. F. J. WARTH, M.Sc., Agricultural Chemist to the Government of Burma, has made experiments which at least must remove certain of the inherent

*The term "germination" would probably have been more applicable to the grain, and "fermentation" to the fluid in which it was soaked.

†HEISER (Victor G.). Beriberi. An additional experience at Culion. How can a knowledge as to its prevention best be applied from the standpoint of State medicine?—*Med. Record*, 1914. Jan. 31. Vol. 85. No. 5. pp. 186-188.

difficulties to such a study. Although primarily in the interest of agriculture and commerce, they have a value to the sanitarian in the matter of beriberi. In *Bulletin* No. 38 of 1914 of the Agricultural Research Institute, Pusa, he opens the subject by pointing to the fact that it is customary to use alkalies to disintegrate grain in the course of removing proteids in the manufacture of starch, and that SYMONS* had suggested "a method for distinguishing starches in this way, as he found different concentrations of alkali are required for the same effects on starches derived from different vegetable products." Warth followed this idea up by attempting to ascertain "more than we do at present about those physical properties of starch which determine its resistance towards alkali." His experiments led him to believe that, by using various dilutions of alkalis, noting the extent of disintegration and liquefaction, as checked by time and temperature, it is possible to "establish a co-relation between the action of alkali and the quality of starch in the grain, so that to the agriculturist and grain dealer "the alkali test may form a useful method of roughly judging rices."

In preliminary experiments he dealt with polished and husked rice. He found that sodium carbonate had no effect upon either. But in solution of potassium hydrate of a strength of 5 to 10 per cent. unpolished grains were not affected, whilst polished grains "were rapidly disintegrated and dissolved." In solutions of 1 to 2 per cent., in incompletely polished grain, the patches of unremoved pericarp were "at once made evident." Again, the extent to which polishing removes the pericarp may be judged by the following table giving comparative weight before and after treatment:—

POLISHING GIVEN TO EIGHT RICE VARIETIES.

Variety.	Weight of 50 seeds unpolished.	Weight of 50 seeds after polishing.	Weight lost in polishing.
No. 1	1.2550	1.1014	.1536
" 2	1.1961	1.0676	.1285
" 3	1.2874	1.1393	.1481
" 4	1.1364	1.0248	.1116
" 5	1.1676	1.0492	.1184
" 6	1.2172	1.0512	.1660
" 7	1.0676	.9700	.0976
" 8	1.5405	1.3706	.1699

He found that whilst a difference in two varieties of grain could be gauged with every concentration of alkali, "there is evidently little or no difference to be found between the polished and twice polished samples."

Although a sanitary officer is not likely to select a camp supply of polished grain in the present day, circumstances might require him

to distinguish between samples of rice of the polished variety. The following table illustrates Warth's results in 24 hours :—

ACTION OF KOH (POTASSIUM HYDRATE) ON EIGHT PADDY VARIETIES.

	Variety	1.0 p.c. KOH	1.25 p.c. KOH	1.50 p.c. KOH	1.75 p.c. KOH	2.00 p.c. KOH
Less resistant varieties.	No. 1 ..	Slight effect	Diffusing	Seeds destroyed	Much gelatinisation	Completely gelatinised.
	No. 3 ..	Disintegrating ..	Diffused	Much gelatinisation	Completely gelatinised	
	No. 7 ..	Slight effect	Diffusing	Seeds destroyed	Much gelatinisation	
	No. 8 ..	Some effect	Diffusing	Seeds destroyed	Some gelatinisation	

Mouldy Rice and Beriberi.

There is ample evidence at disposal showing that FRASER and STANTON's contention as to absence of the pericarp in polished rice representing a serious factor in a form of "beriberi," is correct; an open question, as they allow, is whether the term as used in various countries is not applicable to other as yet imperfectly differentiated diseases. There are still the exponents of hypothetical insect-borne micro-organisms to be dealt with, whilst the group of diet deficiency diseases is expanding. Amongst other matters, it is of interest to ascertain whether rice may not be deprived of its phosphate-bearing pericarp by other processes than milling; for example, owing to injury by moulds and, in this case, whether injurious chemical changes may not be produced in grain notwithstanding subsequent cooking. In this connection, it is worth remembering as to polished rice that it is dealt with in enormous quantities *in bulk* and that before it is transported from rural areas to collecting agents, and by them is forwarded to central spots where rice mills work, there may be many vicissitudes of exposure to alternate wet and heat, especially whilst awaiting transport in bags by railways short of waggons. If the unhusked grain will stand polishing on arrival at the mills, it suffices for trade purposes.

Dr. CHEVALLIER,* in Appendix 3 attached to the Annual Medical Report of the East Africa Protectorate, 1912, deals with an outbreak of beriberi at Serenli amongst native troops and, whilst not forgetting Fraser and Stanton's work, endeavours to dissect facts as observed without bias. He reports 112 cases, with 44 deaths, between November 1911 and April 1912. In the first place, general defective nutrition of these men was possible, as they were supplied with a Government ration which was professedly but partial, as they were expected to supplement it locally. As it happened, local purchases could not be made, and transport difficulties conspired to keep them

*Report on Beriberi at Serenli, December 1911 to May 1912.—*East Africa Protectorate Ann. Med. Report for year ending 31st December 1912*, pp. 68–77.

on short commons. No polished rice was used—white Halwa rice (commonly used by the civil population without any evil results) was alone available. Dr. Chevallier, however, is of opinion that the difference between general malnutrition and beriberi was brought about by the rice ration reaching the men in a damaged condition, consequent upon transport and local storage arrangements “when many of the bags became wet.” He then states :—

“Surely, it is conceivable that rice may become so affected in course of time, especially when exposed to wet and heat, and after much transport in single bags of sacking, as to approach the condition of the polished variety to the extent of losing the same constituents contained in the layer under the pericarp.”

The facts so far—in absence of evidence of the phosphorus contents of the rice—would fit in with Fraser and Stanton’s ideas if previous malnutrition be regarded as the predisposing cause, and moulds be held to have affected the grain, as well as weevils mentioned by Chevallier. But he shows that an escort of 25 men left Serenli just before the outbreak, took with them the same rice and, apparently, were not better off as to daily rations, yet they were free of beriberi. Again, the women of the troops had only one attack of the disease up to February 15th, 1912, but, subsequent to an order to thoroughly clean out their huts, there were 19 cases amongst them with five deaths. Such facts point to local causation, and moulds imported with rice as an hypothesis.

Dr. Gilbert L. Brook, formerly Editor of the *Malay Medical Journal*, has recorded details that would favour the local disease theory to which the *Indian Medical Gazette*, in 1912, called special attention. According to him, in a jail and an asylum both using, during twenty-seven years, over-milled rice, there were shown no marked differences in health. During the first five years both were affected with beriberi, followed by a period of nearly fourteen years’ freedom from the disease. This was terminated by a period of the presence of beriberi in the Asylum of nine years. This outbreak, in 1896, coincided with the presence of the disease in the free population of Singapore. Two years later it appeared in the jail, and this outbreak had a duration of eight years. To this we may add the statement (*Madras Quarterly Medical Journal*, of 1839, Vol. 1) that in 1829 there was beriberi amongst the sepoys in Singapore, but amongst the convicts “who had a similar diet, were worse clothed, more exposed and laboured harder during the day, not a single case of beriberi occurred.”

These facts would point not only to a disease of locality as held by MANSON, but to seasonal conditions modifying the causative agents.

On this subject, Dr. John R. GIMLETTE,* Residency Surgeon, Malay States, has also placed on record matters of much interest. He had under personal observation the hygienic conditions of imported and indigenous labour in the Kelantan State (Federated Malay States). Indigenous labourers were, up to 1904, free of beriberi. They used hand-pounded husked rice. Healthy Chinese coolies were imported in 1903. They were fed on milled rice. In 1904 in a strength of 250, eight cases of beriberi occurred. In 1905, there were in a strength

*Beriberi in Kelantan.—*Rept. of Advisory Committee for Trop. Diseases Research Fund for the year 1913*, pp. 223–227.

of 400, 105 cases with 17 deaths amongst the miners. On BRADDON'S hypothesis, in 1905, Gimlette conceived "the illness was caused by the consumption of the rice, because it had become mouldy in the bags owing to damp, unavoidable delay and difficulty in transport." The use of hand-pounded rice was advised but apparently not carried out, as storage was not feasible.

Early in 1906 the disease disappeared, though milled rice continued to be largely used. A point in the history which is not emphasized by Dr. Gimlette, which we suggest may, on the mould question, be of some importance—having regard to coolie methods of carrying about food articles to work spots—is that this freedom was synchronous with stoppage of underground labour by miners. Meanwhile, many but not all Chinese coolies had left the locality. In 1907, with new coolies on rubber estates, beriberi appeared.

"Thirty-nine Chinese coolies and two Javanese came into hospital from the estate, and out of these twelve Chinese and one Javanese died. Ten cases remained in the wards at the end of 1907, and nine of these were dead before the end of January, 1908. The situation was grave; seven coolies who were in hospital *for ulcers* were attacked with beriberi, and they all died. There were eleven deaths in the wards in January, 1908, and thirteen new cases were admitted from the estate. The bulk of the hospital diets consisted of Rangoon rice, which was well cooked in the ordinary way and not steamed. An enquiry was made into all the rice and food supplies; the diets were found lacking in variety, and mouldy Rangoon rice was found again, but it was not present to the extent that had occurred at the mines in 1905. *The hospital wards were well cleaned, painted, whitewashed and thoroughly swabbed with perchloride of mercury, 1 in 500; this appeared to have a good effect.* In February there were only five new cases, including one Javanese, with no deaths."*

Siam rice No. 2, a more highly polished rice, was then used, but no more cases occurred till December, when there were four cases with two deaths. This rice was continued up to September, 1909. In that year, 13 cases were distributed between January, February and March, and there were 15 in December. There were no cases in the other months. Dr. Gimlette's statement now leaves it to be understood that although the stored Siam rice was still in use, hand-pounded rice was employed by the majority—a few Tamils having "cured rice." Fourteen cases were traced to the camp of a badly fed batch of Chinese coolies under a contractor, but beyond these instances the whole State of Kelantan appeared free of beriberi; although it is understood the importation of polished rice for the general population continued, side by side, with the use of hand-pounded rice. He then quotes A. G. H. SMART as stating:—"In view of the prevalence of beriberi in previous years and the high death rates produced, it is a striking fact that, out of 2,256 admissions to hospital during 1911, no case of beriberi was noticed."

Dr. Gimlette considers that in Kelantan the disease seems to have been more prevalent after heavy rainfalls, when moulds are favoured. The chief monsoon is the North-East from October to March, and a minor South-West monsoon occurs from April to September. He states that, in 1905, when beriberi was prevalent in the mines during the South-West monsoon, "it was found the rice in use was very

*Italics not in the original.

mouldy." He then suggests, as does Dr. Chevallier, that in mouldy rice the phosphorous constituents of the pericarp are destroyed, and points out that the Malays only hand-pound a store for three days' consumption and thus are protected. Thereupon, he concludes :—

"It follows that hygiene, when applied to the imported food supplies of labourers segregated in numbers in lonely places, may be of greater benefit than legislation. In Kelantan, beriberi was, so it seems, imported as a new disease to the Malays, and so long as it existed it seemed to spread by means of a favourable medium—evidently imported rice—but it does not seem to have been brought in by the polished rice that was first imported."

In accounts of beriberi in former days, statements as to "bad" or "mouldy" rice will, the writer thinks, be found as incidents in the history of certain epidemics, but, in view of faith as to the part played by the polished condition of rice, instances in the present day are likely to escape notice. Hence, the accounts by Drs. Gimlette and Chevallier should serve to attract more careful study of the biology and of the influence of moulds on food substances. The facts go to show a "locality disease" in respect to the Hospital incident of Kelantan, as well as the affection of women in the huts after disturbance for clearing, and the freedom of the escort party of the Serenli case. The occurrences in both localities suggest importation in connection with rice—as well as seasonal influence. The history of the "Lodestar" equally points to importation and persistence on board ship, notwithstanding change of crews and cargoes.* Both on board ship and on land once a mould is imported with a grain, the chances would always be that the place used as a store would become infected and, with seasonal changes, the mould would increase and decrease in vitality. Nor would it be right to leave to mouldy grain all possibilities as to destruction of vitamins; the debris of disintegrated grain might well form a nidus favourable to special animal organisms. The condition certainly warrants further search.

SMALLPOX.

Preserved Animal Vaccine.

The following is a Report† by J. W. COLLETT, Acting Principal Medical Officer, Sierra Leone, dated 10th April, 1913, to the Government of Sierra Leone :—

"I have the honour to submit the report called for by the Secretary of State on the trial of 'dried vaccine lymph,' in the Colony and Protectorate of Sierra Leone, and to compare these results with those accruing from the use of 'lanolinated calf lymph' in this climate.

"A consideration of the foregoing table will show that both these preparations of vaccine are very active, and give very satisfactory results; they carry well and retain activity for a considerable time in this climate equally. The preponderance of preference on the part of the medical officers is, however, for lanolinated calf lymph.

"The disadvantages claimed by them for dried lymph are that the entire quantity contained in the hermetically sealed glass tubes has to be utilised

*SMITH (E. C. Montgomery). Beriberi-stricken Cases.—*British Med. J.*, 1898. Nov. 5. p. 1427.

†Report of the Advisory Committee for the Tropical Diseases Research Fund, 1913, pp. 231–232.

at once when the tube is broken in order to ensure the greatest activity of the lymph, a measure that is not always practicable when less than twelve persons can be collected together for vaccination, and that the manipulation necessary for dried lymph is more complicated and not so easy of performance as it is with the lanolinated calf lymph. Dried lymph has to be carefully rubbed up with pure glycerine before it can be successfully used; it does not mix easily with water. Lanolinated lymph is put up in small collapsible metal tubes with screw caps. With this preparation there is very much less waste.

"It is said that although the activity of the dried variety is high, inasmuch as the percentages show, the individual reaction in each vesicle appears to be somewhat greater with the lanolinated variety of vaccine lymph.

"Reviewing the situation, I am inclined to favour the use of the lanolinated calf lymph, because it is apparently quite as, if not more, reliable than dried lymph; it is very much easier to manipulate, it goes farther, and is just as cheap."

The Principal Medical Officer, H. HEARSEY, in his Annual Report of the Nyasaland Protectorate for 1913, on this subject states as follows:—"The lanolinated lymph which is supplied by the Lister Institute of Preventive Medicine continues to give every satisfaction."

SELECTION OF STATIONS IN THE TROPICS.

Granted that sanitary conditions are correctly subserved, is it of advantage in selecting a station for official purposes occupied by "whites" in the tropics that it should be cool, and that to secure this hill sites be favoured? This is a question entered into by Dr. Cameron BLAIR, in discussing the choice of Kaduna as the future capital of the recently united Provinces of Nigeria, in the following manner:—

"Taking every consideration into account, apart altogether from the central position which so strongly recommends it, it would be difficult in the Northern Provinces to find a better site for a capital: it is over two thousand feet above sea level; it enjoys a dry atmosphere—a most important point in the Tropics—and the nights feel cool during by far the greater part of the year. . . .

It is true that, within the Northern Provinces, it is possible to find sites at a higher elevation—over three thousand feet; but elevation is not everything. . . . In tropical regions, Europeans are apt to direct their attention and preference too exclusively to coolness. Now, railways in the Tropics are apt to make the cool climate of elevated regions a serious danger to health. In the absence of railways, the journey from low to high country is necessarily effected slowly and the system thus is enabled gradually to adapt itself to the changed conditions, but when the change is effected by rail, the shock is apt to be too great—much as the indulgence in a cold bath, which is well known to be dangerous to most Europeans in the tropics. . . . In this country, where the official tour of service only lasts a year, there is no time to dawdle by the way for reasons of health or any other reasons; many people will have to make repeated rapid journeys to the capital, and, under all the circumstances, the site selected for the purpose seems to constitute the happy medium—high enough and sufficiently far inland to afford one of the best average climates in the country, and not so elevated as to render sudden coming and going dangerous to those who take reasonable care of themselves. Again, many men, towards the end of the regulation tour of service, are found to be suffering from valvular incompetence due to dilated heart. This affection disappears after the tonic effect of a few months in the bracing climate of Europe. But for men in this condition suddenly to make the journey from a steamy and relaxing, to a dry and cool climate, and an ascent of over three thousand feet in forty-eight hours, is exceedingly dangerous."

Surgeon-General GORGAS has given such a wonderful lesson in Applied Hygiene in the Tropics in the face of dismal forebodings, that it is not surprising to find that he is an optimist. He states:—"The work on the Isthmus will demonstrate to the world that the white man can live and work in any part of the world, and that the settling of the tropics by the Caucasian will date from the completion of the Panama Canal." (*Statesman*, Calcutta, Jan. 24th, 1914.)

The Administrator of the Northern Territory of Australia, in his Report for 1912, maintains that the development of the tropical portion of Australia by the white presents no insurmountable difficulty, and in this he is supported by Dr. HOLMES.

Sir Havelock CHARLES, in his paper "Neurasthenia and its bearing on the decay of Northern peoples in India," read before the Society of Tropical Medicine and Hygiene,* states that a tropical climate represents for the European a strain on his recuperative powers which exhibits itself by forms of neurasthenia, and that in descendants of pure whites under continuous tropical conditions, race degeneration is constantly evident. He holds that "a main factor in the invaliding of public servants in India is a form of nerve exhaustion, which by lowering their vitality and natural immunity renders them more susceptible to the onset of various diseases."

Dr. Basil PRICE, † in his paper before the meeting of the British Medical Association in 1913, equally pointed to the nervous system as the great point of departure from health of the white in the tropics. Both these authorities have exceptionally large experience in dealing with the question of fitness of the European for service in the tropics. In India, at least, medical opinion would support Sir Havelock Charles' view that to meet the strain of official work the European must be of a selected type.

Thus, there are two widely different current theories, and it concerns the practical sanitarian, as shown by the quotation as to selection of sites, to gauge the applicability of one or the other.

The fact that, under altered sanitary conditions, European life has improved in India is shown by the following figures, which, unfortunately, it is not possible to support by those applicable to a later date. The Royal Commission, 1859-63, found that officers of the military forces died at the rate of 31 per mille, soldiers 69, European civilians 20, and that the mean after lifetime of Europeans resident in India was shortened from 21 to 28 years. CORNISH (a former Sanitary Commissioner with the Madras Government) in statistics ranging from 1848 to 1872, found that officers of the Indian Civil Service died at the rate of 14 per mille, but that in the twelve years ending 1873, the rate was reduced to 11 per mille. In contrast he shows, as exemplifying the risks of duties and habits of other officers of the latter period, that officers of the Indian Medical Service died at the rate of 15.7 and of the Indian Staff Corps at 18.04 per mille. But Sir Havelock Charles does not dispute the importance of improved sanitary conditions in modifying the death rate of whites in the tropics. In supporting his opinion, he stated:—"If you damage

**Trans. Soc. Trop. Med. & Hyg.*, 1913. Nov. Vol. 7, pp. 1-31.

† Discussion on the Causes of Invaliding from the Tropics.—*Brit. Med. J.*, 1913. Nov. 15. pp. 1290-1293.

the subservient systems, you injure the whole animal, *i.e.* the nervous system. Tropical climates injure the various systems of the body apart altogether from the dangers of attack from parasitic enemies."

The writer thinks that the opinions are reconcilable, by it being held in mind that the favourable death-rate secured by Gorgas in Panama was largely that of a floating population, whereas the facts referred to by Sir Havelock Charles are concerned with "continuous service" in the tropics. The latter may imply residence, with short intermissions, of thirty or more years in a hot climate, under official "strain." There is not suggested incompetency of the selected European to fulfil his duty, but simply that he does so at a greater expense of physical and mental strain than if he were in a temperate climate.

Now the word "strain" requires interpretation. It involves the plain fact that the European in the tropics earns such bread as he gets "by the sweat of his brow." In all tropical countries where administration is incompletely built up, this must be expected; one reform follows another, not with the leisurely pace of England, when expanding its long established rulings worked by organizations mellowed by time, but so as to cover not one but a dozen duties of staffs that are yet to be created in order to secure a single end. The staffs used though sufficient at one stage of progress are apt to be inadequate in the next, whilst public finances may be insufficient quickly to strengthen them. This well known, and practically unavoidable, sequence of events in unsettled countries is thus adverted to in the Report on Northern Nigeria. After referring to the mistake of failure to provide sufficient house accommodation for Europeans, the Principal Medical Officer adds:—

"With the amazing development of the country, it is inevitable that certain departments, in order to overtake the stress of work, should have to work overtime. Against that I have nothing to say: but when the overtime becomes almost a matter of ceaseless routine up to the hours of darkness, I think it should be a subject for enquiry. It is not fair on the clerical staff. The habit of physical exercise and recreation is a very valuable asset towards keeping a man fit and sane—to some absolutely essential."

The necessity for employing a selected type of European to meet, under tropical conditions, official strain has been interpreted by some lay papers in India as a reason why the European should be further replaced by the Indian. This calculation is, however, beyond the premises of *selection for special work*, and the belief that when the type yields, it does so in a particular manner. The writer is of opinion that whilst in the lower grades of official life in India the bulk have far less duty expected of them than of the commercial classes in Europe, in the higher grades, where responsibility and energy are required, the Indian official is subjected to no less strain than the European and, speaking in the absence of statistics, breaks down under it in greater proportion than the selected white.* *Inter alia*, they are notoriously liable to diabetes, which although conducted to by their special diet and habits, is probably primarily, in this class of case, a mere symptom of loss of nerve control over physiological processes—

* This subject has attracted the attention of the Madras Government: Dr. S. W. PATTERSON (Beit Scholar) proceeds to Madras for three years to investigate it.

often, in our personal experience, as temporary as the neurasthenia of the European, should changed conditions of life be prescribed.

If, then, in judging the fitness of the white for service in the tropics, it is necessary to regard the matter from the point of duration of residence as well as nature of duty exacted, it would be advisable to do so under conditions devoid of disturbing insanitary factors and official strain, and thus arrive at the influence of climate on the human organism.

Experiments fulfilling these requirements have been undertaken by the "Board of Studies of Tropical Diseases in the Philippine Islands," as reported by Major Weston P. CHAMBERLAIN, M.D., U.S. Army.* 1,000 soldiers were under close observation by specially trained medical officers during 1909-'13. As to the hygienic circumstances of these subjects, Chamberlain states: "It is my opinion that nowhere else in the tropical world, except perhaps in Panama, can there be found a collection of men living under such a high degree of hygienic protection as is accorded to the American soldiers serving in the Philippine Islands." He further adds:—"The individuals on whom this report is made had not all been in the tropics for equal periods of time. At the date the men underwent their preliminary tests, the average duration of Philippine service for the group was seven months. The observations were repeated at quarterly intervals for one year, so that at the date of the terminal examinations these soldiers had resided, on the average, for 19 months in the tropics."

Investigations were of the most elaborate character, and embraced observations of temperature under conditions of rest and exercise, contrasting the brunette with the blonde, respiration and pulse rate, blood pressure, body weight, blood as to haemoglobin readings and erythrocyte count, urine, and condition of nervous and digestive systems. In summing up results, Chamberlain arrives at the conclusion that, granted the observations exhibit differences between normal conditions in temperate and tropical climates, they are so slight as to be negligible, and states finally:—"The facts justify the hope that the progress of tropical sanitation may ultimately permit the permanent colonization of certain parts of the tropics."

Now, whilst this conclusion may be correct as to the white serving for short periods in the tropics, the observations may have a different interpretation if applied to "continuous service," in that differences from the normal in the short service may by persistent action in "continuous service" represent important influences. Putting aside loss of weight (1.3 per cent. in 19 months) and the erythrocyte count (which presents small but interesting peculiarities in the direction of an approach to the blood state of the indigenous native, and is to be further enquired into), the only more obvious alterations found are in the respiration and pulse rates, and blood pressure. Thus, accepting throughout American standards for normal rates, it is found that, for the year, the average pulse rate per minute was 77.3 against the normal 72 to 75; respiration was 19.0 against the normal 14 to 18. The yearly average systolic blood pressure, for 229 men of the average

*Some Features of the Physiologic Activity of Americans in the Philippines.—*Amer. Jl. of Trop. Diseases & Preventive Med.* 1913. July. Vol. 1, No. 1, pp. 12-31.

age of 25.3, was 115.8 mm. We select this observation, as it alone exhibits the influence of seasons in the same year (1909). This average was, practically, the same as for Filipinos of twenty-five years of age (115.5), but does not accord with the only normal average quoted for whites in America, namely, 119 mm. of BUCHANAN of Philadelphia. But whilst the yearly average of such experiments has a significance, it is to results in the hottest periods of the year one would look for indications of changes under continuous climatic conditions; this, in the Philippines, would be in the month of May.

Here we find that in 1910, of three quarterly observations on men of average age of 27.7 years for the period commencing May, the blood pressure was 117.1 against 117.8 for the cooler November period. In 1911, only two readings were recorded, namely, for the February period 117.5, whilst the pressure for May was 0.2 mm. greater. The observation, however, lacks the contrast of the cooler months in the same year. So far the hottest month indication of lowest pressure is weakened, but gathers strength again in a further observation on men of average age of 25.3 years, when the pressure for May is 113.9 against 117.5 for December. Another set of observations is recorded upon 991 men, according to length of residence in the tropics, in groups of from three months to twelve months, and should be of special interest, but, the writer thinks, results are vitiated by the fact that they are arranged according to age and not according to length of residence of that age.

Chamberlain gives the average pulse rate for 608 men at 77.3 and respiration rate at 19.3, but again May, in both 1910 and 1911, shows the greatest departure from the average, although the figures are not, as in the pressure observation, consistent. In May 1910, the pulse rate was 77.8 and respiration 19.4, whilst, in 1911, the pulse rate was 77.1, and respiration 19.2. Chamberlain then observes—"the average rate of 77.3 heart beats per minute is a little above the standard of 72 or 75, which has been established for temperate climates. The respiration rate of 19.3 is quite noticeably rapid, if one accepts the standard as 14 to 18 for cool countries."

Definitely, therefore, the influence of tropical when contrasted with a temperate climate is to increase the heart and respiration rhythm; there is also a maximum disturbance of systolic pressure in May, the hottest month, in two succeeding years. If the incomplete observations for 1911 be put aside and those of 1910 only be trusted to, it is found that, in May, the systolic blood pressure is at a minimum and the pulse and respiration rate at a maximum, whilst at all periods these two rates are above the temperate climate normals. Granted that these variations may be of no great moment in men of an average of nineteen months' residence, when applicable to those of "continuous service" treated by Sir Havelock Charles, the extra work demanded of the heart per minute multiplied by years and subject to increase during exertion may imply results that may not be trivial.

Now it is usual, as Chamberlain has done, to refer to rarefied air as at the root of increased respiration and heart action, but the writer ventures the theory that the direction in which to look for the primary strain in the white is the vaso-motor control. In judging of these results, we must premise with Sir Havelock Charles that the white is a special

product of ages in a temperate environment, and consequently the approach to a blood count or blood pressure normal to, say, a Filipino as found by Chamberlain, may be abnormal to the white in the same locality. The facts of the case are probably missed by the use of a measure of systolic blood pressure as against the observation of the effects upon the auxiliary heart (represented by the muscular and elastic fibres of the arterioles) of that pressure and its regulation in the peripheral circulation, which the defunct sphygmograph aided in interpreting by the tracings of the diastolic period. Given dilatation of the skin capillaries day by day for years on end under tropical heat, the vaso-constrictor mechanism is less often caused to function than in temperate climates; and it is conceivable that by lapse of time the control of nerve matter and involuntary muscular fibres may become less efficient by disetude, and by consequent less demand in physiological nutrition processes for the selection of vitamins for nerve nutrition—in the first place of vaso-motor centres. Hence there arises less ability to cope with sudden demands that mean “strain”—by prompt adaptation of blood pressure. From such a starting point, it would be possible to account for a heart, at the first stage with diminished systolic pressure, owing to dilated arterioles increasing its rate in overcoming an approach to capillary stasis thus favoured, with respiration sympathising, and for the nervous system in the white long resident in the tropics proving an ill-nourished and vulnerable point.

Chamberlain's Report declares, as to men of 19 months' residence in the Philippines, that there is no material difference as to diseases of the nervous system when compared with the United States, but that in men who have been resident for over five years “sensations complained of were of slight degree and perhaps in many cases fanciful.” These complaints included loss of memory, insomnia, depression and irritability. Of the genuineness of these complaints he must be the best judge; but one is not disposed to regard an excess under nervous diseases, when compared with the United States rate, to the extent of 1.87 per mille, in men of only 19 months' residence, as without indication of the direction in which climate strain tells.

These elaborate and valuable American observations have cleared so much ground as to the climate factor during short residence of whites in the tropics that they should enable attention, in the future, to be concentrated on physiological functions not in terms of annual averages but during periods of extremes of heat, as tending to interpret the strain of *continuous* service. Admittedly, the vaso-motor theory, so far, has but small grounds for support.

This discussion is prolix but, nevertheless, has a relation to Dr. Cameron Blair's choice of site. His caution as to influence of sudden change of altitudes upon “tropical heart” is undoubtedly judicious where not a sanatorium but an official business centre is intended, implying short visits and rapid transit. At the same time, experience in connection with hill stations up to 7,000 feet, now accessible by rail in India, which are used chiefly for residences of a few months in the hot season, would show that collapse attributable to this cause must be very rare. There are, however, a certain number of persons who find inconvenience in change of pressure at even 3,000 feet, with headache and breathlessness under exertion for a few hours.

Finally we would draw attention to the predilection in choice of sites shown by the demand of an elevation sufficient to afford "cool nights," as stated by Dr. Cameron Blair. We think an important distinction must be made on this point. The desire is founded on the common experience that the staying powers of whites are better where the dilated state of the arterioles has a temporary respite in contraction under a few hours' cool temperature per day, provided the diurnal contrast is not excessive, and it is on this, apparently, that the best hope of white colonization of tropical parts of Australia is founded. The following extract from the preface to the Annual Medical Report for the East Africa Protectorate (1912) shows that indigenous tropical races have not a predilection for "cool nights." Notwithstanding the abundance of arable land, the Principal Medical Officer states:—"It is a curious fact, and worthy of note, that all these regions most sought after by the white and Boer immigrants were, with the exception of the fringe round Nairobi, the areas least inhabited by a permanent native population."

SANITARY LEGISLATION AND RULINGS.

TOWN PLANNING.

In their G.O. No. 1069 M., dated 10th June, 1912, the Government of Madras "in order to ensure that schemes for the extension of towns and the provision of house accommodation undertaken by Municipal Councils are carried out with strict regard to sanitary principles" have proposed a set of rules for the guidance of these bodies. We select a few of them as useful for general application in sites intended for non-European populations :—

1. No scheme for the extension of a town or for the acquisition of land for the provision of house accommodation shall be undertaken by a municipal council unless the site selected by it for such extension or acquisition has been previously approved by the District Medical and Sanitary Officer or the Sanitary Commissioner with special reference to the suitability of the soil for building construction, facilities for drainage and water-supply and other matters.

3. Roads and streets shall be marked out on the site and shall as far as possible run in straight lines crossing one another at right angles. The main roads exclusive of lateral drains shall be not less than 40 feet in width and the secondary roads not less than 30 feet. In the case of long roads, cross roads shall be provided at intervals of from 1,000 to 1,500 feet so as to secure perfilation of air and easy exit.

5. Conservancy lanes 10 feet in width exclusive of lateral drains shall be formed along the backs of houses to enable conservancy carts and scavengers to enter for the purpose of cleansing backyards and for the laying of drainage pipes in the event of the town being provided with underground drainage.

7. The formation of roads, streets and drains must form part of the scheme for laying out the site and should ordinarily be put in hand simultaneously with the execution of the scheme instead of being deferred to a future date.

8. In all cases where the width of the main streets exceeds 30 feet municipal councils shall, as far as possible, plant and maintain suitable avenue trees on both sides of the street.

9. Suitable places for the construction of public latrines shall be selected and set apart for the purpose.

10. Where there is no pipe water-supply, suitable sites shall be selected for the sinking of wells.

11. The land acquired for the extension of a town shall be plotted into house-sites, the size of which shall ordinarily be not less than 45 feet by 60 feet. The sites so laid out shall be sold in public auction subject to such conditions and penalties for failure to comply with them as may be stated in the sale-deed.

12. Purchasers of building sites shall, by a stipulation in the sale-deed which shall also be embodied as a condition in the notice of sale published by the council, be required to complete the construction of their houses within a period of one year from the date of purchase on pain of forfeiting their right to the property without any compensation, if they fail to do so, provided that the municipal council may, for special reasons, grant an extension of time.

13. No house-sites shall be built upon unless and until the purchaser submits a plan of the building to the municipal council and furnishes

the particulars required by section 180* of the Madras District Municipalities Act, 1884, including—

(a) a statement showing the dimensions of the building and the levels at which it is intended to lay the foundation and lowest floor; and

(b) a statement showing the means of ventilation and drainage and the privies which it is intended to provide.

14. No sub-division of house-sites or construction of more than one house on each site shall be permitted.

15. Houses shall be constructed with frontage facing the roads and streets.

16. The construction of houses lying back to back shall be strictly prohibited.

17. No house or outhouse shall be under any circumstances be allowed to be constructed with thatch.

18. The main walls of the house shall not be less than 10 feet high. The eaves must not be less than 8 feet above the plinth.

19. The provision for ventilation shall comprise suitable windows in each room.

20. No house shall be built on a basement of less than 2 feet from the ground and such basement shall be of masonry or some rat-proof material.

21. All backyards of houses shall be provided with a gateway so as to give access to municipal officers for the purpose of inspection and to the private scavenging staff.

22. All backyards of the houses shall be provided with suitable impervious bathing platform for the inmates of the house. Each house shall be provided with a latrine to be made to a standard pattern supplied by the municipal office.

23. All sullage water from a house and its backyard shall be drained into the municipal drain in the conservancy lane and not into the drain in front of the house which is provided to carry off storm water.

24. All cattle yards shall be flagged and properly drained.

25. All houses shall be enclosed by durable compound walls or fences of such description as the council may prescribe.

26. Except in so far as may be necessary for the excavation of foundations or wells or the levelling or sloping of the ground, no purchaser of a house-site shall remove earth from the site for building or any other purpose so as to leave hollows in it.

27. Rules 12 to 26 *supra* should also be embodied as conditions of sale

*This Section runs as follows :—

“ Every person intending to construct, re-construct or extend a well or a building (other than a mere wall) shall, six weeks before beginning to construct, re-construct or extend it, make an application in writing to the Municipal Council for a license to do so.

Such application shall be accompanied by such particulars as the Municipal Council may require under by-laws framed in this behalf, and shall further be accompanied,

(i) in the case of buildings, by

(a) a plan or statement showing the dimensions of the building and the levels at which it is intended to lay the foundation and the lowest floor; and,

(b) a statement showing the means of ventilation and drainage and the privies which it is intended to provide; and

(ii) in the case of wells, by a statement showing the dimensions of the well, the manner in which it is to be fenced and, if the well is to be used for drinking purposes, the means which it is intended to take to prevent pollution of the water.” [“Drinking Purposes” does not fully meet requirements of sanitary protection. The Act is now under revision. W. G. K.]

in the notice of sale published by the council and in the sale-deed before possession of a site is given. In case of breach of any of these conditions the council shall call upon the owner of the plot to make the necessary alterations or provision within a period of three months, in default of which the municipal council shall be authorized to make them itself and recover the cost from the owner.

28. No relaxation of rules 14 to 26 shall be permitted without the prior approval of the Sanitary Commissioner which will be given only on special grounds.

RAILWAY STATIONS AND TOWN SITES.

The following rulings have been approved by Sir F. D. LUGARD, Governor of Nigeria, as to sanitary inspection of railway stations and town sites :—

1. " That the Director of Surveys, the Chief Engineer of the Railway or his lieutenant, the Residents of the localities respectively concerned, and the Senior Sanitary Officer should systematically visit every station throughout the railway system, whether or no actual activity was contemplated thereat, and arrange the lay-out of the station-yard and buildings, the railway area generally, the Traders' siding plots, the European residential quarter, the non-European alien quarter and the native location.

2. That each station so visited should be set out by the Director of Surveys and a plan thereof prepared by him.

3. That any difference of opinion touching the lay-out as shown on the plan should be submitted to his Excellency.

4. That the plan, when finally signed by His Excellency, should become the Official one.

5. That such plan should be filed in the office of the Director of Surveys, and copies in the office of the Chief Engineer of the Railway."

MAHOMEDANS AND SEGREGATION OF LEPERS.

In Northern Nigeria the Principal Medical Officer states that in 1913 there were 243 lepers admitted to camps. The Chief Sanitary Officer whilst acknowledging the helpfulness of the Mahomedan community in forwarding his sanitary recommendations advises tact in pushing segregation. This caution is desirable, but at the same time it is a subject on which Mahomedans should have no hesitation upon religious grounds. Thus, Abu Daood has recorded in the Bukhari the following traditions of the Prophet's sayings as to leprosy :—

(1) " Whenever you come across a leper, flee from him as you would from a lion."

(2) " Talk to a leper in such a manner that the distance between you and him be no less than the length of two spears."

(3) " Do not eye the leper closely."

TREATMENT OF WASTE.

MAKESHIFT CONSERVANCY.

The dry earth committal of foecal matter by the feline tribe meets presumably the special requirement of preventing alarm to their prey by tell-tale odours. It is typical of methods for early nitrification of foecal matter, which both the sanitarian and agriculturist would desire. It is fully recognized under the sanitary laws laid down by Moses in Deuteronomy, chapter 23, verses 12 and 13, thus:—"Thou shalt have a place also without the camp whither thou shalt go forth abroad, and thou shalt have a paddle upon thy weapon, and it shall be when thou wilt ease thyself abroad thou shalt dig therewith, and shalt turn back and cover that which cometh from thee." Mohamedans recognize Moses, and we understand that those of scrupulous principles occasionally show adhesion to this mode by having at the end of their sticks or staves small spuds for formation of excavations. The official "on tour" as it is termed in India, or "patrol," as is apparently recognized in some of our African colonies, resorts in camp life not infrequently to modification of the same principle. It is, in fact, the most inoffensive and rapid method of disposal yet excogitated.

Many years back the writer inaugurated, under the term "Jewish conservancy," a modification of the system for public use, which was readily resorted to by Indians at festivals. The space required is such that in large assemblies it will be possible to use it only on the outskirts of a town for a surplus of people not otherwise provided for. It recognizes the fact that persons without discipline will not make holes but will use them if provided, and that most will not take the trouble to cover the hole after use, so that this also must be done for them. The method gives considerable privacy, as any hole can be chosen, and any position assumed, and as the arrangement is cleanly and odourless, there is nothing to offend the sense of sight or smell of the user. It is, necessarily, not a method that can be relied on in rainy seasons, and presupposes plots of ground readily penetrable such as are found in fields that have been cultivated.

Certain of the Medical and Sanitary Reports in Africa show that at railway stations and market resorts, where conservancy for normal traffic is provided, large numbers of "bearers" or labourers suddenly appear on the scene. In such cases, as well as in camps for engineering "construction works," which shift from time to time, the method should be useful, as the latrine boy would, in good soil, have a lighter task in preparing holes than in carrying buckets for distant disposal, cleansing, and returning them. The method worked in connection with any institution having arable ground at disposal, so as to use plot after plot of ground, would place excreta economically in the best possible position for quick nitrification, and enrich the ground for subsequent cultivation. The following is a description of the method as applied to construction works camps:—

"A place is marked off in a field, conveniently close to the works—say, not exceeding 100 yards distant—by means of four flags. Within the square space so selected are made pits, at distances of three feet from each other. These pits measure six inches in diameter, and eight inches

in depth. On one side of each pit is placed the earth excavated from it, and a piece of split bamboo two feet or so high, having a small coloured rag at the end, is fixed at the same side as the piled earth. On the side nearest the works, is placed, so as to preserve the sitters from observation, a moveable screen, which may be made of jungle tree branches intertwined with any foliage that will secure protection from sight. It is necessary to retain a man on duty on the site throughout the working hours . . . He will see that defaecation occurs in the holes *only*. *The moment a person retires,** it is the attendant's business to proceed to the hole used, and remove the split bamboo—showing that the hole is not to be again used—and with the movement of his foot to throw the earth, piled as stated above, into the pit. If the attendant be too “nice” to do this himself, there is no reason why, without much pressure, he should not be able to convince the person who has used the pit, that it is his duty to move the earth with his foot, and thus cover the excreta.”

The pits can be made by a crowbar or pickaxe, but such holes are liable to be irregular in size, and consume time in the making. The use of a special spade is therefore advised. This has for the blade a form similar to that of a garden trowel and is provided with a shaft of plain iron, with a bar at right angles for the foot in using pressure in penetrating the earth. The trowel portion should preferably be made of steel, and have slightly sharpened edges. With this spade it is possible to make a pit by two movements—each cut making half.

RAT-PROOF DUST-BIN.

As a measure against plague, Dr. Arthur STANLEY, Medical Officer of Health at Shanghai,† recommends a house refuse receptacle of the automatically closing type so as to prevent access of rats. He states that it is the outcome of “years of experiments” and that its use has secured a “marked improvement in the cleanliness of alleys.” He thus describes it:—

“The approved form of receptacle is made of brick and cement concrete, is three feet long by two feet deep, with a sloping top having a small door which cannot be opened beyond the vertical and so automatically shuts itself after house refuse has been emptied in; and having an iron door at the side with a special fastening of which the house refuse removal coolie only has the key and through which refuse is daily removed. These receptacles have been erected by the sanitary staff, the property owners providing the necessary materials, which cost \$6 for each receptacle.”

*The man must be distinctly obedient to this instruction. The tendency is always to lessen journeys by allowing several holes to be used, and then covering the lot—thus effectually frustrating the object of not offending sight or smell of users.

† Shanghai Municipal Council, Health Dept. Annual Report, 1912.

SANITARY WORKS.

ANTI-MALARIAL WORKS.

The following, from the Senior Sanitary Officer's Report for Northern Nigeria for 1913, illustrates the use of a syphon for aiding drainage :—

At Baro, "the swamp was really effectively tackled at last, by the Assistant Locomotive Superintendent, who devised a cunning syphon arrangement, which at low level effectively drained the lower aspect into the Niger. In connection with the upper aspect, where the marsh water stands at two levels, arrangements were made to cut a drain from the higher to the lower level."

In the Annual Report for 1912, on the Medical and Health Department in the Colony of Mauritius, the Sanitary Engineer, J. LOIS NAZ, states the following anti-malarial works have been executed :—

"On the Mount Estate, there was a marsh of several acres, caused by a dyke having been built across the Pamplémousses River, from which the factory drew its water supply. The dyke was removed, and a deviation canal with an intake higher up the stream was built to feed the factory. The marsh was then drained by means of a central trench, cleared of rushes and aquatic vegetation, and is now being cultivated.

On the same estate, as well as on the one above the river, the Pamplémousses River had no proper bed, with the result that along its course aquatic vegetation and marshes existed. A proper bed large enough for flood waters and deep enough to dry the banks where thick vegetation existed, has been provided. Three thousand feet of marshy jungle is being done away with and will be soon under cultivation. Work of a similar nature is being done along the same river and will be reported upon later on. . . . At Long Mountain, an extensive marsh existed along the Ruisseau Meunier known as "Sanassee" marsh. This was drained by sinking the stream bed running through it; and, as no proper bed existed, either up or down stream, on a total length of two thousand five hundred feet, causing marshes all along, the sinking of the bed was also carried out there." . . . "At Flacq, twelve hundred feet of solid rock had to be blasted at a depth of ten feet below surrounding ground to provide an outfall for the centre of Flacq marsh. The rock being fused, lava was especially hard to deal with, and five thousand dynamite cartridges had to be employed during the operation."

SANITARY SURVEYS AND ENGINEERING AID.

The following is an Extract from a Madras G.O. No. 917L, dated the 2nd August 1904, to which we have referred in our Note on "Malaria in Bengal":—

"They therefore accept his [the Sanitary Commissioner's] statements, that the campaign against malaria to attain any fair measure of success must include not only the destruction of mosquito larvae on pools, but also administration of quinine, and minor engineering works to relieve the surface and subsoil water flow. They are disposed to place particular trust on well considered measures of the latter nature, as tending to the securing of radical results. The Government are accordingly prepared at once to see effect given to the scheme as a practical portion of the regular sanitary programme in every municipality and throughout the jurisdiction of every Local Board in the Presidency When the scheme sanctioned in G.O. No. 1558L dated the 7th December 1903, comes into operation, the District Medical and Sanitary Officer will have at his disposal a subordinate capable of drawing up plans and estimates for minor sanitary engineering works, such as would be required in an anti-malaria campaign. Pending the appointment of this additional staff, District Boards should, for such time as the District Medical and Sanitary Officer shows necessity, place directly under his orders an engineering subordinate capable of levelling, drawing and making estimates in respect to works of the minor nature required. Necessary instruments and lascars should be provided."

DELTA LAND RECLAMATION.

Reclamation of marsh land by silting is a process that requires much time combined with continued engineering supervision, to secure that the new land should have the necessary gradient for permanent drainage works.

Temporary aggravation of malaria conditions during the process, until drainage is unquestionably established, may occur. Silting is by no means new to India. Indians along the Godaveri have long formed islands on the stream bed by silting within palasading formed by grass and trees. In Ootacamund, a considerable portion of the present gymkhana ground was recovered from a lake by this method; and in the hands of irrigation engineers in Southern India, the training of silt-bearing streams by using the tree and grass known in the vernacular, respectively, as "neer nutchi" and "nannal" is commonly practised. As stated in another Note in this issue, an establishment must be maintained for regulation of silting; hence, the modern method of land reclamation by pipe-line hydraulic dredgers in situations approachable by rivers and canals rich in silt is preferable. The method is peculiarly suitable in delta land reclamation, for not only is it possible thus to restore waterways and build embankments, but to fill the neighbouring marshy lands and to raise the level of areas. Thus the Ellicott Machine Co., of Baltimore, and the Morris Machine Works, Baldwinsville, U.S.A., furnish dredgers which can deliver silt or stiff clay to distances of over a mile with a lift of 25 feet. Certain of their machines have dealt with suitable material at the rate of 7,000 cubic yards for 24 hours. Such dredgers of course deal chiefly with sand or silt, but are not put "out of duty" by dealing for long periods with gravel and boulders. The raising of the level of Galveston, in America, was one of the first instances of dealing with a large area intended for buildings.

Apparently the utility of these machines in performing the duty at once of clearing silt and elevating land is not being contemplated in Bengal, as we find in estimates for clearing the Bidyadhari that there is a heavy and progressively increasing item for rental or purchase of ground for embankments and for storing silt that has been dredged. Yet it would seem unlikely that even in this particular area there is no suitable locality for elevation, or for filling, or that in many parts of Bengal the function of clearing the beds of rivers and of canals could not be profitably combined with land reclamation, within a mile or more of portions dredged.

In Burma an excellent start in this direction has already been accomplished. Along the navigable creeks which are off-shoots of the Irrawaddy are Municipalities where busy trade is conducted at elevations perilously near tidal action, so that, the houses are built on piles over water. Here, the raising of sites is of the greatest importance sanitarily, and is also likely to be profitable by land reclamation. In Pyapon, in Burma, 147 acres of a total of 300 sanctioned for reclamation have been completed by this method, and whilst warning that no formal mosquito survey has yet been carried out by the Sanitary Department, and that this must be awaited for final opinion, the Superintending Engineer, P.W.D., Pegu Circle (Govt. of Burma) has reported officially that the inhabitants are fully agreed that there

has resulted a marked reduction of mosquito prevalence. His personal opinion is thus stated: "When I next visited Pyapon, in April, 1913, and when reclamation of the Civil Station was completed, there was distinctly less number of mosquitoes and I suffered little inconvenience from sitting outside a mosquito-proof room after dark. When I again visited Pyapon in February * last (1914) there were hardly any mosquitoes at all. There is not the slightest doubt that the place has been greatly improved and that owing to the destruction of these mosquitoes fever is less prevalent." On completion of the Pyapon work, the site of the Municipality of Kyaiklat has been undertaken. The Superintendent Engineer states: "The sanctioned estimate provides for (Kyaiklat) for the reclamation of about 90 acres, out of which about 46 acres have been done up to date. There is already a marked improvement in the health of the people. . . . A small portion of Bogalay town has also been reclaimed up to date. It is proposed to reclaim the following towns in the Delta in the near future, if funds allow:—(1) remaining portion of Pyapon town; (2) Bogalay; (3) Dedaye; (4) Mawlamyaing; (5) Wakema."

There are few delta lands where this modern method would not prove of great utility; it is possible that a combination on a large scale of dredging silted rivers, embanking, and pumping might prove advantageous in preparing areas for cultivation in the still unused and more recently formed portion of the Bengal delta, and in protecting by these measures against future invasion by malaria (in judiciously selected sites) they might prove remunerative as productive engineering works. As a small instance of reclamation we would point to the drainage of swamps near Calcutta in the canal area, as having increased four and five times the value of the land. Except near towns such value will doubtless be exceptional, but it is worth remembering that there are over ten millions of acres of land classed as cultivable in Bengal *which are not so utilized*, some of which is probably near silted rivers.

VILLAGE WATER SUPPLY.

To supply the average village in the tropics with a well in a correctly selected site, and constructed so as to be safe from surface and subsoil pollution is but part of the problem of sanitary protection, for there still remains the difficulty of contamination during water withdrawal by hands, feet, vessels, ropes, etc., and direct entrance of impurities by the mouth of the well. The mosquito has also to be guarded against. Hence the universal precaution of providing a cover. Putting aside lifting of water by mechanical means on behalf of groups of inhabitants, the usual desire is to secure a mechanical arrangement that shall be worked by individuals on their own behalf. For Indian caste people there must be no leather in the apparatus, and, for villagers of all countries, it must be practically unbreakable. Hence, an experiment by the Madras Government to supply at least one fully sanitarily protected well for each village in these Districts will be watched with interest. It has been resolved to use semi-rotary pumps for lifting. This choice of form of pump meets many objections, and it is certainly little liable to get out of order under reasonable treatment. But, in rural areas, the ordinary fate of any form of lifting

* This is a season favourable to prevalence.

apparatus is to be put out of action by some simply acquired defect, and therefore to be abandoned as useless. The centre of the Madras scheme, however, is that this fate may not befall the semi-rotary pumps; as itinerant mechanics will be appointed for reasonably large areas, who will be responsible for repairs.

WELL BORING.

In some tracts in the tropics it is not uncommon to find sweet and brackish water within a few feet of each other—a matter incident upon soil and subsoil configuration, and its previous history in formation. It is hence a matter of disappointment to excavate a well only to find it hopelessly brackish. For depths of ordinary shallow wells, in the absence of rock, the driving of a Norton's tube well—to be afterwards withdrawn—suffices for exploration and test of the quality and supply of water at disposal. After that depth, tube-well driving, although feasible, ordinarily gives place to boring. Hence the Madras Government have arranged that District Boards should send subordinates to a class of instruction to be held twice yearly by their Sanitary Engineer, with the object of boring methods being explained. They anticipate economy will result by more full use of preliminary boring. They advise each Board to purchase the following apparatus. As the list may prove useful elsewhere, we reproduce it:—

ESTIMATE for a set of boring tools and plant for District Boards to bore to a depth of about 50 feet in all classes of soil up to hard rock.

Item number.	Quantity.	Description of tool or plant.	Rate.	Per.	Amount.	Total.
			RS. A. P.		RS. A. P.	
1	1 ... No.	Open (clay) auger, 2½ in. size ...	30 0 0	Each.	30 0 0	
2	1 ... "	Worm do. 2½ in. " ...	30 0 0	Do.	30 0 0	
3	3 ... "	Nose shell auger, 2½ in. " ...	42 0 0	Do.	126 0 0	
4	1 ... "	Flat chisel, 2½ in. size ...	14 0 0	Do.	14 0 0	
5	1 ... "	V do. 2½ in. " ...	15 0 0	Do.	15 0 0	
6	4 ... "	Hand dogs, 1 in. size ...	7 0 0	Do.	28 0 0	
7	1 ... "	Lifting dog, 1 in. size ...	15 0 0	Do.	15 0 0	
8	1 ... Set.	Tiller rods with screws, complete ...	22 0 0	Set.	22 0 0	
9	1 ... No.	Swivel rod (short), 1 in. size ...	15 0 0	Each.	15 0 0	
10	4 ... "	Lengthening rods, 10 ft. long each and 1 in. square.	15 0 0	Do.	60 0 0	
11	1 ... "	Lengthening rods, 5 ft. long each and 1 in. square.	14 0 0	Do.	14 0 0	
12	54 L. ft.	Boring pipes, 3 in. internal diameter and ½ in. thick; screw joints, flush inside and outside.	4 8 0	L. ft.	243 0 0	
13	2 ... Sets	Pipe clamps or rests (long type) ...	24 0 0	Set.	48 0 0	
14	1 ... No.	Bell screw or bell box ...	30 0 0	Each.	30 0 0	
15	1 ... "	Crows foot ...	15 0 0	Do.	15 0 0	
16	2 ... "	Four-ton lifting bottle jacks with wrought iron cylinder.	15 0 0	Do.	30 0 0	
17	1 ... "	Iron pulley ...	5 0 0	Do.	5 0 0	
* 18	1 ... "	Wooden platform ...	30 0 0	Do.	30 0 0	
* 19	3 ... "	Camara or similar poles, 25 ft. to 30 ft. long.	...	L.S.	10 0 0	
20	2 ... "	Manilla rope coils, 50 ft. long and 3 in. circumference.	8 0 0	Each.	16 0 0	
21	1 ... "	Monkey spanner, 12 in. size ...	4 12 0	Do.	4 12 0	
22	1 ... "	Do. 10 in. " ...	4 8 0	Do.	4 8 0	
* 23	1 ... "	Mamooti ...	1 0 0	Do.	1 0 0	
* 24	2 ... "	Crowbars, 5 ft. long ...	1 8 0	Do.	3 0 0	
* 25	1 ... "	Cutting knife (billhook) ...	2 0 0	Do.	2 0 0	
* 26	1 ... "	Clay auger cleaner ...	0 8 0	Do.	0 8 0	
* 27	1 ... "	Rose shell do. ...	0 8 0	Do.	0 8 0	
28	1 ... "	Measuring tape, 50 ft. ...	4 8 0	Do.	4 8 0	
Total			...	...	816 12 0	
Add for freight fluctuation of prices, etc.,			...	L.S.	183 4 0	
Grand total of estimate ...						1,000

NOTE.—The items consist of all the required outfit complete, Items marked * may be had or made locally.

VITAL STATISTICS.

In opening his Administration Report for 1912, the officiating Sanitary Commissioner for the Punjab, Lieutenant-Colonel BROWNING-SMITH, I.M.S., discusses the vexed question raised by the Government of that Province in their Review of the Report as to the using of "estimated populations" in compiling vital statistics for the Province. He shows that if the estimated population were employed, the total death rate for the Punjab of 25.9 per mille would be reduced by 0.7, and the birth rate of 44.1 would be 1.2 per mille less.

Whilst fully recognizing the value of the method, the Sanitary Commissioner fears that the departure from uniformity with the vital statistical returns from other Provinces would cause inconvenience. This has been the usual method of regarding the matter, and a protest to this end was made some years back by the late Army Sanitary Commission when the method was brought into use by a Sanitary Commissioner with another Government in India. It obviously would have been troublesome to them, as a preliminary to any criticism they wished to make, to have to verify the estimated population at periods for each Province as a whole and, at times, of localities. Moreover, in the present condition of inaccurate registration of vital statistics they must have felt, as probably does Lieut.-Colonel Browning-Smith, that the labour would be largely futile.

Unfortunately, there is in India another objection which forces itself on notice, namely, that epidemics are still imperfectly dealt with, and that in a country so largely dependent on agriculture, and this again upon wayward monsoons, there can be few successive periods of ten years in any Province when the rate of increase of a population is more than approximately that of the previous intercensal period. For example, the death rate for the quinquennium ending 1905 was 42.7 per mille, as calculated upon the average census population for that period, but the census of 1911 showed there was a decrease of 1.7 per cent. of the population against an increase of 6.9 in the intercensal period 1891-1901; so that, at certain stages, the death rate must have been greater than that expressed, seeing that 355,381 people were gradually disappearing from the population. This great decrease was chiefly due to malaria and plague. The moral is that an intercensal period of ten years in India is inappropriate, and that, in view of imperfect registration and of the influence of epidemics and famines, the normal census should be supplemented by a simple numerical reckoning at quinquennial periods.

On the other hand, the use of the estimated population in India except in such extreme cases as quoted is likely to lead to a better approach to the truth than a bare reckoning upon the census population; for it is an absurdity in attempting to arrive at the value of sanitary efforts in a population, to point to great improvements in death-rates (under reasonable conditions of increase) reckoned upon the figures of a recently conducted census, as contrasted with, say, the last one or two years for the intercensal period, and, thereafter, to continue with each Annual Report the tone of complacency, till the actual increase of the population, and with it a numerical increase of deaths, renders apologies necessary.

What we believe is the correct course to adopt, in the face of poor registration results available in India and elsewhere in the tropics, is to follow the uniformity of plan which Lieutenant-Colonel Browning-Smith thinks necessary, by employing the census figures when referring to ordinary matters, but, where elucidation of special facts is required, there should be no hesitation in attempting to gain better light on the subject by using estimated populations in contrast. This is apparently also the conclusion to which the Punjab Government has committed itself in an ably written Review of the Sanitary Commissioner's Report.

There is at least another way in which the use of the estimated population may be of utility as a matter of routine, and get rid of much of the difficulty of incorrect registration. The man who trusts to getting a population well vaccinated, and therefore sees that a proportion of births (checked by the deaths) representing an infantile population is duly accounted for, may find himself confronted with extraordinary evidence of the want of efficacy of vaccination, by reason of a certain number not being overtaken by registration and traced thereby. In the Madras Presidency whilst, in deference to indigenous opinion, vaccination is deferred till an infant is six months of age, as contrasted with three months in Great Britain, there is yet reserved power of vaccinating within that period in the presence of smallpox, and compulsion is in force as to the unvaccinated up to ten years of age. With this explanation, it will be seen from the following stereotyped "letter form" (addressed to Municipal Chairmen who are responsible for legal working of the compulsory clauses, and in constant use as a check upon vaccination in the Municipalities of the Madras Presidency) that the use of the estimated population affords aid in gauging vaccination results. As a sample, the blanks of the form are filled with figures:—

"Taking into consideration the population of your town, as shown by the last census and the rate of increase then ascertained, there should survive to pass through the vaccinators' hands at the end of two periods of six months 2,099 infants before the end of the year 1894, of whom, allowing for 'leaving the town' and similar causes of disappearance, at least 94 per cent. should be returned as actually vaccinated. Again, it would not be unreasonable, taking into consideration the state of vaccination up to date in your town, to suppose that at least 30 per cent. of children between 1 and 5 years of age still require vaccination, giving a total of 3,698 *primary* vaccination cases. Further, if re-vaccination be effected on the very moderate scale of 3 per cent. of persons living between 10 and 15 (4,959) and 2 per cent. of persons between 20 and 25 (4,433), this class of operations should amount to the modest total of 238. In all, there should be therefore performed at least 3,936 operations this year, or about 328 cases per month against 120 performed by you."

BOOK REVIEW.

TURNER (J. A.) [M.D., D.P.H., Executive Health Officer, Bombay Municipality.] **Sanitation in India.** (With Contributions by B. K. GOLDSMITH, M.B., D.P.H.; S. C. HORMUSJI, L.R.C.P., M.R.C.S., M.D., D.P.H.; K. B. SCHROFF, L.M. & S., D.P.H., D.T.M.; and L. GODINHO, L.M. & S., M.D., D.P.H.)—viii—1014 pp., 8vo. 1914. Bombay: The Times of India. [Price 15s. nett.]

Dr. Turner opens his book bearing the above title with the statement that he does not claim to have covered "the whole area of sanitation in India, which is a very wide one," and adds "there is in the book much that relates to purely local sanitary methods of a large city like Bombay, but we make no excuse for this, for we hold that the highest standard should be aimed at." Well, as both Calcutta and Madras are quite large cities and old enough to take care of themselves, it is not necessary to take up cudgels on their behalf; but so long as the halalkore system and its noisome shafts are in existence in Bombay, at least the value of the standard must be open to question. The author gives as the *raison d'être* of the book the teaching of Sanitary Inspectors [Surveyors?] "during twelve years" in Bombay City; but in a treatise dealing with the whole of India, with Bombay as its text, space might legitimately have been found for the statement that the Madras Presidency had preceded this by a *compulsory* ruling affecting both municipal and rural authorities during the last *twenty* years. Similarly, if any such historical retrospect was necessary for his purpose, it was desirable to add that also "twelve years" back, not only Bombay, but the Bengal Government, by a special grant, arranged to teach men of the Surveyor (B.E.) class for the same purpose.

The holding of the Health Officership of a city of the size of Bombay is no sinecure, and this fact is demonstrable in Dr. Turner's book. He evidently has allowed himself but little leisure from official duty to devote to this large work; so that a marked amount of duplication of information has escaped elimination in the final proof; a result perhaps facilitated by the treatment of the same subjects under different heads and certainly emphasized by it. For example, the description of the staff and duties of District Registrars, as stated at pp. 20-21, is reproduced and amplified at pp. 42-43; at p. 175, it is stated "wherever trenching is tried the manure finds a ready sale," but, in again treating the subject at p. 179, it is held "in many cases there is no sale for the resulting manure"; at p. 494, the bacteriological methods of distinguishing cholera from other bacilli are stated, but these are repeated in an altered sequence at p. 489; at p. 411, a description of anthrax in animals is given, but this does not prevent the etiology of disease in animals being again discussed at p. 595, as a prelude to a reference to its occurrence in man; and whilst, at p. 411, cremation of an anthrax infected animal is alone advised, at p. 595 the alternative of burial is given; at pp. 572 and 573, respectively, details of the application of "pesterine" and the use of sunshine as a pulicidal measure are fully described, but are repeated at p. 722 and 723; the duties of Inspectors as to cholera are laid down at p. 509, and are repeated at p. 732 and 733. Occasional printer's errors occur, of which the most obvious is at page 107, where it is stated "as is well-known, the ordinary atmosphere contains about 4.04 per cent. of carbon dioxide."

If absence of leisure by a hard-worked official accounts for these undue repetitions, the punkah may well have been a disturbing factor in mixing the arrangement of "copy": as, in perusal, one is at times subjected to mental shocks, such as felt by the aviator in unexpected descents from one stratum to the other through "air holes." Thus, at p. 252, referring to relative cost, the opening paragraph of seven lines makes a general statement on the subject of cost of chemical or tank post-treatment, but the remainder of the section deals with the contrast between details of construction of "contact beds," whilst, under the latter heading, both

contact beds and percolating filters are described. It is an unexpected feature of this very involved treatment of sewage purification, for which Bombay is indebted for much original work conducted throughout ten years by Mr. JAMES (to which latterly Major Glen LISTRON, I.M.S., and Dr. TURKHUDD contributed), that nothing is stated as to the Matunga experiments; whilst the standard quantity of sewage per area of filter is dealt with by reference to an experiment in York, England.

On the subject of the disposal of waste, much useful information is given by the author; but his assertion that it is the "custom in Indian towns to throw the refuse and garbage in the streets and narrow lanes, where it is collected by the municipal staff twice or thrice daily" is not admissible—so far as the Madras Presidency is concerned. Where collection is not from house to house, in that considerable fraction of India, the inhabitants are required to deposit refuse in public dust-bins—usually movable—and normally do so; a fact of indirect interest as to rats and plague prevalence. Hence, the basis on which Dr. Turner calculates rubbish collection staffs is inapplicable to at least that part of India. Neither would it be possible to write this of the "Benighted (?) Presidency"—"every form of filth is thrown out of a window into the street, and packets of paper or leaves containing excreta may constantly be seen descending on the pavement or street, very often on the heads of the passers-by."

Dr. Turner is somewhat misleading as to organization of such parts of a Sanitary Service as exist in India. He conceives a Sanitary Commissioner with the Government of India with Deputy Sanitary Commissioners with Local Governments; the independent Sanitary Commissioners with the Local Governments are with the author negligible quantities. Equally, the author's ideas of extant sanitary law in India are incomplete and therefore misleading, even in regard to the Presidency of Bombay.

The author has reproduced rules used in Bombay for guidance of the municipal staff. These *a priori* ought to be useful to Municipal Health officers generally; but they disclose, throughout, the vain attempt to make Departments mutually check each other to such an extent that if duties required were really fulfilled, efficiency would be at a discount.

At page 94, Dr. Turner thus sums up the history of the discovery of the connection between the rat flea and plague: "Yersin's experiments prove conclusively that plague is communicable by ectozoa, especially rat fleas, principally *Pulex cheopis*, which act as passive intermediaries and carriers of the bacilli." Granted that YERSIN suggested the flea as an intermediary, it is certainly not on record that he brought conclusive proof. With OGATA originated the first experiment *ad hoc* by injection: the first proof was secured by SIMOND, and the rescue of that fact from oblivion, towards which it had drifted, by experimental proof is to the credit of Major Glen LISTRON, I.M.S., and its wide applicability to the Members of the Indian Plague Investigations Committee. Several good illustrations are produced on the subject of plague; but the one showing the coolly putting down baits (page 563) with his hands, hardly realizes the ideal of preventing the undesirable suspicion of human contact owing the sense of smell of the rat.

In matters connected with food inspection, Dr. Turner is at his best. Yet hasty editing is apparent in the treatment of beriberi: for whilst Baron TAKAKI's as well as BRADDON's theory is detailed, no allusion is made to the work of FRASER and STANTON, nor the efforts of Major GREIG, I.M.S., in expanding the findings of the latter authorities.

The author, in discussing anti-smallpox vaccination, unwittingly does his countrymen an injustice in repeating the old calumny of the interpolation into the Shastras by stating that "Ellis of Madras" perpetrated a "pious fraud," in representing that vaccination was an ancient Hindu institution. This controversial matter has been thoroughly threshed out from time to time, and it has been shown that there is no evidence to connect the only ELLIS of Madras of the period concerned, whose knowledge of Sanscrit would have sufficed for this dishonourable conduct. If he were in any way connected with the matter, it was as sceptic, not as a perpetrator. Nor, indeed, has it been established, whilst there is ground for suspicion that the passage referred to is a fraud.

More time devoted to editing a second edition will get rid of defects we have mentioned, as well as bring into better relief the fact that throughout the book are scattered sound sanitary doctrines, which will certainly cause it to fill a useful position in the library of those interested in sanitation in the Tropics.

W. G. K.

SAVAGE (William G.). [B.Sc., M.D. (Lond.), D.P.H.] **The Bacteriological Examination of Food and Water.** Cambridge Public Health Series.]—x + 174 pp. Demy 8vo. with 16 illustrations. 1914 : Cambridge University Press. [Price 7s. 6d. net].

The aim of the Cambridge Public Health Series is the production by well known authorities of books which shall bring together scientific observations in a form which shall favour their being used practically—that is, the necessities not of the bookworm but of the man of applied hygiene are considered. This end has been well met in one of the latest issues of the series, "The Bacteriological Examination of Food and Water"; so that the reader will find condensed within 170 pages the bulk of extant information on the subjects treated, without the trouble of deciding the rival claims of bacteriologists as to whether their particular methods are those which can alone secure trustworthy results.

The book does not afford special experience derived from the tropics, and therefore whilst the important truths as to bacteriology of water supplies which HOUSTON's work has so fully established for temperate climates must remain the standard of comparison, the reader must be prepared to realise that there are differences in the vitality of certain microbes in the tropics, and hold in mind the dicta of Major CLEMESHA, I.M.S., in his "Bacteriology of Surface Waters in the Tropics."* But, so far, the records of the bacteriology of food as found in hot climates are negligible in quantity, and consequently, the worker there will find brought together in this book information of great value which is otherwise not obtainable, except in exasperatingly scattered literature. Its perusal will at least cause the man in the tropics to realise more fully than generally is the case that the care of the health of the "white in the tropics" does not end with screening his quarters from mosquitoes, flies or rats, or providing a good water supply. He will find the invaliding and death-rate undesirably high, so long as his measures of prevention do not affect the larder, the kitchen and the cook. The average Englishman if he realises at all the horrors that exist is apt to regard them as inevitable, and to believe that "if ignorance is bliss 'tis folly to be wise," and blames the climate for mysterious ill-health instead of his kitchen. There is natural reluctance of the medical man to pry into conditions which are intimately domestic and private—but many lives would be saved in the tropics if, before writing his prescription, the medical man would invade the sacred, and often vile, precincts of the kitchen. No casual inspection will suffice; he must be prepared to hunt every nook and cranny of the kitchen and larder for evidence of filthy towels, tables, cooking utensils and bacteriologically ridiculous methods of storage and use of milk, water, ice, and various foods. We can safely commend the teachings of this concise book as likely to afford sound assistance as to the directions which such search should take.

Nor should the artistic *chef* of the tropics and his personal habits be regarded as negligible factors, in the hunt for the *fons et origo mali*. A useful experience in this direction has been placed on record by Drs. J. A. HARAN and Alexander ROBERTSON†, in Appendix I of the Annual Medical Report of the East Africa Protectorate for 1912, where it is shown that 14 cases of enteric fever at Nairobi were of kitchen origin. The reporting officer, after offering evidence incriminating the hands of natives in

*1912. Calcutta : Thacker, Spink & Co. London : E. & F. N. Spon, Ltd.

†Report on Cases of Enteric Fever in Nairobi between October, 1911, and March, 1912.—*E. Africa Prot. Ann. Med. Rept. for year ending 21st Dec., 1912.* pp. 60-65.

domestic service, concludes:—"From a consideration of the circumstances attending all these cases, we have come to the conclusion that the majority, if not all of them, were probably due to contamination of food resulting from the hands of the patients having become infected by contact with matter containing the germs of enteric fever."

Dr. Arthur STANLEY, of Shanghai, has taken up the question of "Kitchen hygiene" with vigour, and not only recognizes the position of the Medical Officer of Health on the subject,* but demands the attention of architects to requisite structural conditions; and to show his faith goes with his words, he invites persons about to visit houses locally to ask for a sanitary inspection, which he gives without fee. On this subject of work without pay, we recognize that he who makes a single blade of grass grow where none was before has the satisfaction of knowing he is a benefactor of mankind; but it is our opinion that a sanitarian who stifles his reluctance to interfere in domestic matters, and dares at once the indignation of the housewife and cook by condemning kitchen arrangements in the tropics, deserves a more *palpable* honorarium from Government invaliding Committees, Life Insurance Societies and Orphan Funds.

W. G. K.

*Shanghai Municipal Council, Health Department, Annual Report, 1912, p. 32.

A letter was received from Dr. Robert LESK in May, commenting upon a review published in this *Bulletin* in January (Vol. 3, p. 69) on the Complications of Amoebic Dysentery. An explanation of the point to which Dr. Lesk drew attention was inserted in *Bulletin* No. 10, p. 570. Dr. Lesk writes again asking that his original letter be published.

"Bemerkungen zu dem Referat des S.R.D. (Douglas) über Lesk (Robert): Ueber seltenere Komplikationen der Amoeben-Dysenterie etc. im *Tropical Diseases Bulletin* January 30, 1914, pagina 69:

"Der Referent (S.R.D.) ist der deutschen Sprache nicht so weit mächtig, um das Recht beanspruchen zu können, eine deutsche Publication zu beurtheilen. Als Beweis: In seinem Referat kommt der Referent zur Auffassung, dass der Kranke mit Parotitis von der Dysenterie geheilt war und dann die Parotitis bekam ("einige Monate zuvor Dysenterie gehabt zu haben.") Der Wortlaut im Original ist:—"schon einige Monate an Dysenterie litt." Das bedeutet deutsch, dass der Kranke seit einigen Monaten Dysenterie hatte und augenblicklich—zur Zeit der Parotitis—die Dysenterie noch hatte.

Mit der Konstatierung dieser Thatsache erübrigt es sich, weiter auf Details einzugehen. Erwähnt sei nur, dass Gemeinplätze angeführt sind, da es sich um eine Publikation handelt auf Grund eines Vortrages mit Krankendemonstration."

DR. ROBERT LESK.

Weltervreden, 2. 5. 1914.

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[No. 5.

RELAPSING FEVER.

COSKINAS (Georges S.). **Fièvre récurrente et Syndrome méningé (Épidémie de Fièvre récurrente en Grèce pendant et après les deux Guerres de 1912-1913).**—*Bulls. et Méms. Soc. Méd. des Hôpit. de Paris.* 1914. May 7. 3 sér. Vol. 30. No. 15. pp. 772-780.

The author was attached to a hospital in Salonica during the Balkan war, and observed numerous cases of relapsing fever amongst the troops. In the military hospitals of the first line there were many cases of the infection being transmitted to medical attendants and nurses, as it was impossible to free the patients from lice and, in the Section directed by the author, out of 200 patients 30 became infected with relapsing fever.

This disease was first observed in soldiers that had been in contact with Turkish prisoners, and there can be no doubt that the relapsing fever that occurred in the Greek army was originally introduced by the Turks.

The author then gives an account of the clinical symptoms of the disease as observed in about 17 per cent. of the cases in Salonica and also at Athens. The syndrome consisted in the presence of Kernig's sign, stiffness of the neck and other muscles of the body, hyperaesthesia and troubles of the intellectual faculties, the combined symptoms having a decided meningeal aspect. These symptoms were so marked in certain patients that occasionally cases of relapsing fever at first were mistaken for cases of cerebro-spinal meningitis. The cerebro-spinal fluid of the patients was examined in most of the cases and was always found to be clear, though there was a slight increase in the albumin content.

This meningeal syndrome may appear in the relapses as well as the first attack, but is more frequent in the latter; the prognosis of the disease is not affected by the presence of such symptoms.

In several patients the quantity of urobilin in the liver was enormous, and three patients showed the presence of this substance in the urine, without pigment or biliary salts, but the author at present is unable to decide as to its significance. The article is accompanied by detailed clinical descriptions of eight patients who presented meningeal symptoms.

E. Hindle.

LAFFORGUE. Le Syndrome méningé dans la Fièvre Récurrente. Polymorphisme symptomatique de cette Maladie.—*Bulls. et Méms. Soc. Méd. des Hôpit. de Paris.* 1914. May 21. 3 sér. Vol. 30. No. 17. pp. 883-887.

After referring to the observations of COSKINAS (see above) regarding the frequency with which meningeal symptoms sometimes occur in cases of relapsing fever, Lafforgue describes the history of one or two patients who showed similar symptoms in Tunis. Moreover, he insists upon the presence of urobilinuria in cases of relapsing fever, and although the diminution in globular resistance may accentuate this phenomenon, the lesions of the liver and especially of the bile ducts are considered sufficient to explain its occurrence.

E.H.

ARDIN-DELTEIL, RAYNAUD (M.), COUDRAY & DERRIEU. i. Syndrome Méningé dans la Fièvre Récurrente Nord-Africaine.—*Bulls. et Méms. Soc. Méd. des Hôpit. de Paris.* 1914. June 25. 3 sér. Vol. 30. No. 22. pp. 1126-1149. With 15 charts.

ii. **Note sur les Réactions cytologiques observées dans le Liquide Céphalo-Rachidien de Malades atteints de Fièvre Récurrente Nord-Africaine.**—*Ibid.*, pp. 1149-1153.

i. As a general rule relapsing fever is rarely associated with any nervous symptoms. The patient preserves his intelligence, and can speak and answer questions correctly, this mental lucidity being in marked contrast with the high temperature and the intensity of the general symptoms. In a certain number of cases, however, distinct nervous symptoms are present and one or two authors have called attention to this fact [see above]. The authors observed 41 cases of relapsing fever during a recent epidemic in Algeria, and in sixteen of them well marked meningeal symptoms were present. Detailed descriptions, accompanied with charts, are given of fifteen of these cases, from which it appears that the nervous symptoms are mainly present during the initial attack of the disease. Lumbar puncture was practised on the majority of the patients, and in all cases the fluid was clear, though the albumin content was augmented. In no case could any spirochaetes be detected. Moreover, two attempts to infect human subjects—one by injecting 3 cc. of cerebro-spinal fluid into the pleura, and the other 2 cc. into the subarachnoidal cavity—gave negative results. In both cases the fluid was collected from patients whose blood contained numerous spirochaetes. In a few of the patients jaundice appeared concurrently with the meningeal symptoms; in three cases it was only manifested by a slight colouration of the conjunctiva, but in two cases typical jaundice was present.

In conclusion the authors state that the appearance of meningeal symptoms during an attack of relapsing fever is not so rare as is generally believed. Although slight in some cases, in others these symptoms may be so well-marked that the clinical aspect of the patients may resemble cases of cerebro-spinal meningitis.

[This is the most complete account hitherto published of the meningeal type of relapsing fever, and as this form of the disease seems to be comparatively common in North Africa, the present paper constitutes a very desirable addition to the literature on the subject.]

ii. Lumbar puncture was practised on 33 patients and in every case the fluid obtained was characterised by the presence of a marked lymphocytosis associated with a mononucleosis. This change is constantly present in the cerebro-spinal fluid of patients infected with relapsing fever and may be observed during the febrile attacks as well as in the apyretic intervals. It persists as long as the infection is in the body and its disappearance is a sure sign of recovery.

These conclusions are in opposition to those of COSKINAS and LAFFORGUE (see above), but the differences may be explained, as the present authors used an improved technique in examining the fluid.

E. H.

JOB (E.) & SALVAT (J.). *La Fièvre Récurrente à Casablanca.*—*Bulls. et Mém. Soc. Méd. des Hôpit. de Paris.* 1914. July 23. 3e sér. Vol. 30. No. 26. pp. 159-164.

Between May 1913, and June 1914, the authors observed 51 cases of relapsing fever at Casablanca (Morocco). The spirochaete (*S. berbera*) responsible for the disease is transmitted by lice, which explains the fact that epidemics of relapsing fever accompany outbreaks of typhus.

In more than two-thirds of the cases, two attacks were observed. The most frequent complications were affections of the liver and, when this organ was not in a healthy state prior to the infection, the disease tended to be serious. Meningeal symptoms were observed in a single patient only.

The authors treated a few of the patients with injections of organic arsenic compounds and obtained satisfactory results with neosalvarsan administered in doses of about 0.01 per kilogram body-weight.

Particulars are given of a few of the cases, including the only one that was fatal, viz., that of a patient who had previously suffered from syphilis and whose liver was affected in consequence.

E. H.

BILLET (A.) & GRENIER (M.). *Sur la Fièvre Récurrente au Maroc oriental. (Note préliminaire.)*—*Bull. Soc. Path. Exot.* 1914. May. Vol. 7. No. 5. pp. 382-384.

The authors record the presence of relapsing fever at various stations along the region of Morocco bordering on Algeria. In all 72 cases were observed, of which 20 occurred in Europeans and 52 in natives. The epidemic was very benign and not a single death occurred.

The infection seemed to be carried by the native porters, who probably spread the disease from one station to the next. In all places where epidemics occurred numerous ectoparasites were present.

One of the workers in the hospital was infected in the following manner. Whilst a rabbit was being inoculated with some infected blood a few drops of the liquid squirted up into the face of the operator without, however, any of it touching either his eyes or lips. Although

he disinfected himself immediately, 10 days later he suffered from an attack of relapsing fever. This observation shows, the authors believe, that the spirochaetes are capable of passing through the skin, as well as mucous membranes.

The incubation period was generally 8 to 10 days, but was only 4 days in the case of a man who was injected subcutaneously with a few drops of infected blood. This subject only presented one attack, whilst the general number of attacks was two, and once three.

The parasite is considered to be *Spirochaeta berbera*, Sergeant and Foley.

For treatment, the administration of neosalvarsan or galyl gave excellent results. But the disappearance of the spirochaetes was never complete before the expiration of 12, 15, or 24 hours after the injection.

E. H.

BRAULT (J.) & MONTPELLIER (J.). **Quelques Recherches Hématologiques au Cours de la Fièvre Récurrente Nord-Africaine.**—*Gaz. des Hôpit. Civils et Militaires*. 1914. July 2. Vol. 87. No. 75. pp. 1237-1241.

The authors have made a systematic examination of the blood of twenty patients infected with relapsing fever in Algeria and give the haematological formula and globular resistance of twelve cases. The results show that in spite of the distinct increase in the number of polymorphonuclears a haematological examination is of little assistance in diagnosing the infection. The globular resistance seemed to be affected only in those patients that had previously suffered from malaria.

E. H.

BRAULT (J.) & MONTPELLIER (J.). **Note sur la Présence du Spirille de la Fièvre Récurrente Nord-Africaine, dans quelques Liquides et Excréta de l'Economie.**—*Bull. Soc. Path. Exot.* 1914. June. Vol. 7. No. 6. pp. 472-473.

The authors have examined numerous cases of relapsing fever at the hospital of Alger-Mustapha and succeeded in finding spirochaetes in the cerebro-spinal fluid of two out of twenty cases. For examination the liquid was centrifuged and then stained with various substances, the most satisfactory results being obtained with the "Tribondeau" method. In one of the patients the spirochaetes were relatively abundant in the cerebro-spinal fluid, but nevertheless no meningeal symptoms could be detected.

In another patient spirochaetes were found in the sweat collected from him at the crisis of the infection, whilst in another case spirochaetes were met with in the tears. It seems, therefore, that these parasites may be present in very diverse parts of the body. In all these four cases the spirochaetes were very numerous in the peripheral circulation, but great care was taken to prevent any blood entering the various liquids examined.

E. H.

WU LIEN-TEH (G. L. TUCK). **Some Observations on Relapsing Fever at Tongshan.**—*North Manchurian Plague Prevention Service Reports* (1911-1913). 1914. London: Cambridge University Press. pp. 98-106. With 1 plate.

Since the beginning of 1912 numerous cases of fever had been observed among miners working in the Kaiping coal mines, and Dr. ANDREW on his arrival there diagnosed the disease as relapsing fever and was successful in finding the parasites (*Spirochaeta recurrentis*). The following year the author visited the district and investigated the cause and mode of transmission of the disease. The epidemic occurred mainly among the miners, for out of 168 cases admitted into hospital between January and March, 1912, 158 were miners from the Tongshan district. After having made the diagnosis Dr. ANDREW commenced intravenous injections of neosalvarsan in doses of 0.75 gm. Marked improvement was noticed 12 hours later, and only one death was recorded out of over 70 patients treated.

The conditions of life among the miners are then described and, as the men work in shifts and on returning from work occupy the beds vacated by their comrades, it is obvious that there is every opportunity of infection being spread by lice. Out of 32 patients examined all were infected with lice, but bed bugs could only be found in two cases. In five out of ten cases the stomach contents of these lice contained spirochaetes, often in great numbers, whilst no parasites could be found in the bed bugs. Neosalvarsan was administered to 22 patients in 0.75 gm. doses and in every case the symptoms of the disease disappeared within 24 hours. After an injection there was a marked leucocytosis, the total leucocyte count varying from 9,000 to 40,000. After mentioning the chief clinical features of the epidemic, the author describes a few illustrative cases, from which it is apparent that the relapsing fever of this district closely resembles that of other parts of China. Arrhenal was tried on a few patients, the drug being administered intravenously in doses of 0.016 gm., but its action was very uncertain and it was much inferior to neosalvarsan.

Finally, various measures are recommended for stamping out the disease, most of which are directed against the lice responsible for the transmission of the infection. The more important are systematic cleaning of the dwellings occupied by the miners, large free baths, and the provision of a large steam-pressure steriliser where the clothes of the coolies could be sterilised once a week free of charge.

E. H.

CASAUX (J.). **Considérations épidémiologiques concernant la Fièvre Récurrente au Tonkin.**—*Bull. Soc. Méd. Chirurg. de l'Indochine*. 1914. Apr. Vol. 5. No. 4. pp. 142-150.

A review of observations on the epidemiology of relapsing fever in Tonkin, in which the author shows that it is almost certain that the disease has been endemic in the province for a long time but has only been recognised of late years. Its seasonal distribution supports the view that the infection is transmitted by lice, as it is especially frequent in winter, when the natives crowd together in houses.

E. H.

DARLING (S. T.). **Relapsing Fever in Panama.**—*Trans. xvii Intern. Congress of Med.* London. 1913. Sect. xxi. Trop. Med. & Hyg. Pt. 2. pp. 279-282.

The relapsing fever of Panama is identical with the type occurring in both New York and Colombia and is caused by the same parasite, *Spirochaeta novyi*. The disease seems to have been introduced into the Canal Zone on the Atlantic side, probably from Colombian ports, *viâ* Colon, and one case in this town was detected in an American who had only arrived four days previously from a South American port near by. Since 1907 one third of the cases have occurred at Portobello, but from 1904 to 1913 only 46 cases have been observed all told, in the proportion of 9 whites to 4 blacks. Now, as the proportion of whites to blacks is only about 2 to 9, it is evident that there is a disproportionately large number of cases amongst whites, and Darling is inclined to believe that the Commission quarters and barracks never became infected, but the patients became infected by visiting native villages.

According to FRANÇA, in Colombia the disease is spread by *Ornithodoros turicata*. In Panama the corresponding tick infesting the native houses is *Ornithodoros talaje*.

With regard to the specificity of strains the author remarks that the following points should be noted in attempting to determine the variety of spirochaete in any given case of spirochaetosis:—

- “(a) Type of febrile reaction and gravity of disease.
- (b) Species of susceptible animals and the type of infection in the same, *i.e.*, single or multiple paroxysms.
- (c) Number, abundance, or relative sparseness of spirochaetes in the peripheral blood of the patient.”

E. H.

PRIMET. **L'Emploi au Tonkin des Arsénicaux dans le Traitement et la Prophylaxie de la Fièvre Récurrente.**—*Trans. xvii Intern. Congress of Med.* London. 1913. Sect. xxi. Trop. Med. & Hyg. Pt. 2. pp. 283-285.

The author gives a summary of the results obtained by various medical officers in the treatment of relapsing fever in Tonkin since the introduction of salvarsan. The wonderful efficiency of this drug is well shown by the following particulars.

In Nam-Dinh, according to PAUCOT, out of 102 patients injected subcutaneously with salvarsan there was a mortality of 5.9 per cent., whilst under ordinary circumstances the mortality would have been 50 to 75 per cent. In 87 injected intravenously with varying doses, the mortality was only 2.9 per cent. On the other hand, whatever the dose injected, relapses were commonly observed, sometimes even double relapses. In twenty cases spirochaetes were again present in the blood during the relapses. The latter occurred on the 7th to the 25th, 26th and 29th day after treatment.

At Ha-Dong, MARTIN treated 270 patients with salvarsan and reduced the mortality from 40 to 3 per cent. The minimum efficient dose for an adult was found to be 0.2 gm. At Kien-An (VASSAL and HERBIN) out of 195 patients treated in the same way, only two died. The dose employed was 0.25 gm. in 200 or 250 cc. of fresh serum for adults, and 0.10 gm. for children.

At the native hospital of Hanoï, MOUZELS treated 174 patients with salvarsan and the mortality was 3·44 per cent. The dose varied from 0·15 to 0·40, but this observer is of the opinion that 0·20 gm. is sufficient for an adult Annamite.

[All observers agree that intravenous injections are preferable to any other form of administration and this method is now being universally employed. In addition to arresting the course of the disease in the patients themselves, the sterilisation of the blood effected by an injection prevents any ectoparasites becoming infected, and thus epidemics are prevented from spreading.]

E. H.

KLEMM. **Behandlung von Rückfallfieber mit Salvarsan (Ehrlich-Hata 606).** [The Treatment of Relapsing Fever by Salvarsan.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Aug. Vol. 18. No. 15. pp. 528-530.

The author states that salvarsan is well-known as a specific for the treatment of relapsing fever, but its action depends on various factors, such as the way in which the drug is administered, the amount of the dose, and the period when treatment commences.

In Usumbara, German East Africa, the author has treated a certain number of cases, both European and native, and gives particulars of seven patients, some of whom showed relapses after having received injections of salvarsan. The results support the following conclusions.

During the first attack the injection of salvarsan, either intravenously or intramuscularly, causes the symptoms of the disease to disappear. A complete cure during the first attack, however, was only effected if the patient received an intravenous injection of at least 0·5 gm. salvarsan, preferably on the first day of the infection. When the drug was administered during the relapses, or intramuscularly so that the medicament was only absorbed slowly, or if in slight doses, the patient's body was not sterilised and in most cases further attacks were not prevented.

E. H.

BRAULT (J.) & MONTPELLIER (J.). **Essai de Traitement de la Fièvre Récurrente Nord-Africaine par des Injections intra-musculaires d'Olarsol.**—*Bull. Soc. Path. Exot.* 1914. June. Vol. 7. No. 6. pp. 473-475.

The authors have treated nine cases of relapsing fever with injections of Olarsol (a preparation of neosalvarsan suspended in oil). The substance was injected intramuscularly in doses of 0·2 to 0·45 gm. and in two cases produced a general reaction, in one patient taking the form of headache, bilious vomiting and diarrhoea, and in the other oedema followed by a slight albuminuria. In both cases the symptoms disappeared within 24 hours. The site of the injection generally continued sore for about a week, and in one or two patients was extremely painful.

In every case the drug seemed to have no effect on the course of the disease and therefore the employment of intravenous injections of

neosalvarsan must be used in preference to oily preparations of the same substance. The latter, being absorbed only very slowly, are of no use in the treatment of an infection like relapsing fever, in which the organism requires to be sterilised very rapidly.

E. H.

FOLEY (H.) & VIALATTE (C.). **Traitement de la Fièvre Récurrente Nord-Africaine par le Néosalvarsan et l'Olarsol.**—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 569-571.

During a recent epidemic of relapsing fever at Beni-Ounif-de-Figuig (Sud Oranais) that occurred almost exclusively amongst the natives, the authors treated a certain number of individuals at various stages of the disease. Two methods were employed, either intravenous injections of neosalvarsan, or intra-muscular injections of an oily solution of the same drug, known as olarsol.

The results show that doses of 0.05 to 0.1 gm. of neosalvarsan per kilo body-weight, injected intravenously, are sufficient to cause the disappearance of all symptoms of the disease and to prevent relapses. The best results are obtained by administering the drug during the pre-critical period of the infection (see LEVADITI, this *Bulletin*, Vol. 1, pp. 39-40), when rapid cures can be obtained with small doses.

Similar doses of olarsol injected intramuscularly were never efficacious, and did not prevent the occurrence of relapses.

E. H.

SERGEANT (Edm.) & FOLEY (H.). **Transmission de la Fièvre Récurrente par Dépôt sur les Muqueuses intactes du Produit de Broyage de Poux prélevés sur un Spirillaire.**—*Compt. Rend. Soc. Biol.* 1914. Mar. 27. Vol. 76. No. 11. pp. 471-472.

The authors collected some lice from the body of a patient suffering from relapsing fever, towards the end of the first attack. Six days later these were crushed up in a few drops of saline and the liquid was placed on the nasal mucous membrane and conjunctiva of two monkeys, which both became infected, one seven and the other eight days later.

Lice from the same patient were collected four days after the end of the second attack, were immediately crushed and the resulting liquid was introduced into the conjunctival sac of an Arab. Although this liquid contained numerous spirochaetes this Arab never became infected, but it should be noted that the subject was syphilitic and had recently undergone a prolonged treatment with iodine and mercury.

E. H.

SERGEANT (Edm.) & FOLEY (H.). **Des Périodes de Latence du Spirille chez le Malade atteint de Fièvre Récurrente.**—*Compt. Rend. Acad. Sciences.* 1914. June 22. Vol. 158. No. 25. pp. 1926-1928.

During the course of an epidemic of North African relapsing fever (due to *Spirochaeta berbera*, Sergeant and Foley, 1910) the authors collected blood from patients during the apyretic intervals and

inoculated it into monkeys in order to test its infectivity. The blood was collected from ten patients and the following results obtained:—

Day of apyrexia.	Result of inoculation into monkey.		Incubation period in the monkey.		Relapse of patient after —days.	
2nd ..	+	..	9	..	6 days.	
2nd ..	0	..	0	..	No relapse.	
2nd ..	+	..	6	..	8 days.	
4th ..	0	..	0	..	No relapse.	
5th ..	0	..	0	..	No relapse.	
5th ..	0	..	0	..	No relapse.	
5th ..	+	..	6	..	8 days.	
6th ..	+	..	5	..	(?)	
7th ..	+	..	4	..	8 days.	
9th ..	0	..	0	..	13 days.	

In every case the blood inoculated was carefully examined, both fresh and stained, but in no case were any spirochaetes observed, nor any abnormal appearances. Yet, with the exception of the individual in which the relapse was very much delayed (thirteen days), in all cases this blood was infective. Moreover, it will be observed that the incubation periods of the monkeys inoculated with blood during the later part of the apyretic interval are shorter than those infected with blood collected during the earlier part. This fact supports the idea of a periodic development of the parasite within the body, and proves that the blood is still infective during the apyretic intervals when no spirochaetes can be detected.

In 1908 the authors* made analogous observations in the case of lice that had fed on patients infected with relapsing fever. E.H.

SERGEANT (Ed.). & FOLEY (H.). *De la Période de Latence du Spirille chez le Pou infecté de Fièvre Récurrente.*—*Compt. Rend. Acad. Sciences.* 1914. July 6. Vol. 159. No. 1. pp. 119-122.

The authors call attention to the fact that in 1908-1909† they demonstrated the transmission of relapsing fever by means of the body-louse. The part played by this insect was shown by (1) an epidemiological study, (2) the infection of monkeys by the inoculation of the bodies of lice collected from infected patients, and (3) by feeding infected lice on two healthy persons who became infected as a result of this procedure.

The rôle of the louse in the transmission of this disease having thus been established experimentally, it remained to study the morphological changes undergone by the spirochaete in the body of its invertebrate host.

This year the authors have made further researches on the subject and obtained the following results. In every case after the infecting feed the lice were fed on normal subjects and examined daily by crushing a few, preparing films, and staining with Giemsa.

Lot 1. Lice having made a single infected meal; at least four lice examined daily until the fourteenth day. From the first to the eleventh day, in 45 lice, no spirochaetes. On the twelfth day spirochaetes appeared, becoming more and more numerous on the thirteenth and fourteenth days. From the twelfth to fourteenth days out of twelve lice, five contained spirochaetes.

**Ann. Inst. Pasteur*, 1910, Vol. 24, p. 337.

†*Bull. Soc. Path. Exot.*, Vol. 1, p. 176 and loc. cit.

Lot 2. Lice having made two infected meals; at least four lice examined daily until the sixteenth day.

At the end of 5 hours, out of 6 lice, 3 contained spirochaetes.

At the end of 24 hours, out of 6 lice, 1 contained spirochaetes.

From the 2nd to the 10th day out of 34 lice, 0 contained spirochaetes.

From the 11th to the 16th day out of 20 lice, 5 contained spirochaetes.

In another series (Lot 3) spirochaetes were found in lice up to the 25th day after an infected meal; whilst in a further series (Lot 4) out of 500 lice having made a single infected meal, out of 122 lice examined between one and eleven days later, none contained spirochaetes.

The results of the inoculation experiments are also very interesting. Lice having had a single infected meal, then nourished on healthy subjects, were ground up and inoculated into monkeys after varying intervals as follows:—

1 day after the infected meal out of 5 monkeys inoculated 1 became infected.			
2 days	"	5	3
3 "	"	6	1
4 "	"	4	1
5 "	"	1	1
6 "	"	4	4
8 "	"	1	1
9 "	"	2	0
10 "	"	1	0
11 "	"	1	0

In a further series of experiments with Lot 4 mentioned above, the following results were obtained:—

10 lice inoculated into a monkey the	3rd day after the infected meal produced no infection.
10 "	5th day after produced infection.
10 "	10th day after produced no infection.
10 "	11th day after produced no infection.

It seems, therefore, that during the eight days following a meal of infected blood, the body of the louse does not contain any spirochaetes, but these reappear later, and these results agree with the observations of NICOLLE, BLAIZOT and CONSEIL in 1912. But, nevertheless, during this period the lice contain an infecting virus.

One must admit, therefore, that the spirochaete of relapsing fever can take on another minute form which is equally virulent, and probably takes a similar form in the blood of an infected patient during the apyretic intervals between the attacks.

The authors consider that the existence of this cycle of development is an argument in favour of the protozoal nature of the relapsing fever spirochaete.

[The earliest work on the transmission of relapsing fever by lice was done by MACKIE in 1907 during an epidemic in India. Sergeant and Foley published the results mentioned at the commencement of the above paper in 1908-1909, whilst later NICOLLE, BLAIZOT and CONSEIL repeated these experiments and suggested the probable mode of infection, namely, that the infective material contained in the body of an infected louse penetrates the skin through the excoriations produced by scratching. Sergeant and Foley do not seem to have looked for the presence of a granular or coccoid phase of the spirochaete during the period when spirochaetes, as such, cannot be found in the body of the louse.]

SERGEANT (Edm.), FOLEY (H.), GILLOT (V.) & BÉGUET. **Sur les Pouvoirs Spirillicide et Agglutinant du Sérum des Malades et des Convalescents de Fièvre Récurrente.**—*Compt. Rend. Soc. Biol.* 1914 July 3. Vol. 77. No. 23. pp. 226-229.

During the epidemic of relapsing fever that occurred in Algeria during 1914, the authors investigated the sera of certain patients, in order to determine whether antibodies were present during the various attacks and also in the apyretic intervals. The sera of 29 patients were examined in this way as well as three infected monkeys, and as controls the sera of five healthy men and one monkey. The results with the human sera were as follows:—

During the first and second attacks no agglutinating properties can be detected and the spirillicidal power is either *nil* or very feeble. During the apyretic interval between these attacks both agglutinating and spirillicidal properties appear in the serum, but the spirillicidal power is weaker in the same patient during the last days of the apyretic interval than during the first. After the second attack both properties are more marked than after the first.

In a patient whose first attack had been cut short by an injection of neosalvarsan, the spirillicidal properties of serum taken five days later, although distinct, were not considerable in comparison with those of untreated patients. The existence of agglutinating properties is not necessarily associated with spirillicidal powers, and METCHNIKOFF has noticed that agglutination is not an essential condition for the disappearance of the spirochaetes from the blood. If the serum is heated to 56° C. for half an hour the spirillicidal and agglutinating substances are still active.

With the monkeys the serum of those individuals that had a slight infection four months previously possessed no spirillicidal properties, whilst that of an animal that had suffered from a severe infection six weeks previously immobilised spirochaetes in four hours. The latter did not become infected when inoculated with infected blood seven days after being examined, whilst two out of the three remaining monkeys, whose sera did not contain spirillicidal substances, and which were inoculated at the same time, became infected.

It is evident from these results that one can diagnose relapsing fever by means of its serum reactions, and the examination of the serum from a convalescent who had suffered from an undiagnosed fever clearly indicated that this had been a case of relapsing fever.

E. H.

SERGEANT (Edm.) & FOLEY (H.). **De l'Immunité dans la Fièvre Récurrente.**—*Compt. Rend. Soc. Biol.* 1914. July 10. Vol. 77. No. 24. pp. 261-263.

It is well known that in certain cases patients who have recovered from an attack of relapsing fever may be reinfected, and in monkeys NICOLLE and BLAIZOT found that the immunity following an attack is sometimes less than six to nine months. The authors made various observations on this subject during the Algerian epidemic of 1914 and experimented on monkeys, in addition to observing human cases.

With monkeys it was found that an animal which had suffered from a severe attack was immune against re-infection one and a half months later, and its blood possessed spirillicidal properties *in vitro*. Another monkey was still immune four months after an attack, but the spirillicidal properties of its blood had disappeared. In the case of a slight infection immunity was hardly present four months after the attack, and the only evidence of its existence was the mildness of the second infection.

In man the immunity acquired by an attack of relapsing fever is not of very long duration and disappears after a few years. Nevertheless, reinfections differ from the first ones in the absence of relapses, and thus one of the principal characteristics of the disease is not developed.

E. H.

GRENIER (M.). **Etude Expérimentale de *Spirochaeta berbera*.**—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 565-568.

The author has studied the receptivity of various laboratory animals to *Spirochaeta berbera*. Like NICOLLE and BLAIZOT he was able to infect adult rabbits, by injecting them intravenously with 5 cc. of human blood containing the parasites, and several passages could be made in rabbits. Infection was obtained with only 2 cc. of infected blood when injected intra-cardiacally.

In addition the author finds that very young rabbits, not more than three or four weeks old, can be infected by subcutaneous inoculations of infected blood. As a general rule the parasites appear in the circulation 24 hours later and persist for two to five days, after which they disappear and no relapses are observed.

Out of eleven mice inoculated with infected blood only one showed spirochaetes in its blood. This individual was inoculated at the base of its tail. A jerboa was found to be susceptible to subcutaneous inoculation. Six rats, two fowls, four guinea-pigs, three sparrows and three swallows were all inoculated subcutaneously with infected blood, but gave entirely negative results.

E. H.

LEISHMAN (W. B.). **Relapsing Fevers.**—*Trans. xvii Intern. Congress of Med.* London. 1913. Sect xxi. Trop. Med. & Hyg. Pt. 2. p. 282.

The author adds some important notes on the nature of the chromatic granules observed by him in *Ornithodoros moubata* infected with *Spirochaeta duttoni*, and considered as part of the life-cycle of this organism. His study of a small number of species of ticks does not support the view that these granules are found in species of tick not known to transmit any spirochaetosis, for typical granule clumps were only observed in *Ornithodoros moubata*, *O. savignyi* and *Argas persicus*, all ticks which are known to transmit such infections.

Employing dark-ground illumination, continuous observation of these granules with the microscope in a thermostat has shown the author, in the case of two ticks, the definite extrusion of small and actively motile spirochaetes from these granule clumps.

The author concludes :—

"I am still of the opinion that the clumps I described are derived from spirochaetes; that after about ten days at a temperature of 28–30° C., and with a relatively high humidity, some of these clumps give rise to young spirochaetes, which become free, are actively motile, multiply by fission, and may persist in the tissues of the tick for many months."

E. H.

BALFOUR (Andrew). **Notes on the Life-Cycle of the Sudan Fowl Spirochaete.**—*Trans. xvii Intern. Congress of Med.* London. 1913. Sect. xxi. Trop. Med. & Hyg. Pt. 2. pp. 275-278.

In this interesting article the author adds some remarks to his previous papers on the life-cycle of the Sudan fowl spirochaete. With regard to the nature of the intracorporeal bodies, first observed by him, Balfour is of the opinion that such factors as temperature, atmospheric humidity, and general climatic conditions play a great part in determining the development of spirochaetes, both in the animal host and in the insect vector.* Although the nature of these bodies is yet unproved there is no doubt of their parasitic nature, and if they do not represent stages in the development of the spirochaete they must be a distinct parasite of fowls and geese, which can be conveyed by tick-bite and is closely associated with spirochaetosis. The author adheres to the former hypothesis and gives particulars of an experiment in support of his views.

A healthy chick freed from vermin was carefully isolated in a glass jar and on November 15th was fed with 90 washed tick eggs from mixed samples of *Argas persicus*. Many of these eggs contained granules but none showed spirochaetes. On November 23rd a few inclusions were found and after this a daily increase in their number was noted, multiple infection being observed on November 27th and "morula" stages on November 29th. On November 30th the chick first showed definite signs of illness, but from December 1st to 6th the bodies diminished in number and the bird improved in health. On December 7th, there still being a small "body" infection, spirochaetes appeared in the peripheral blood. They disappeared the following day and were never again found, but the inclusions persisted in the blood until the death of the chick on February 17th.

The author has obtained some evidence to show that *in vitro* the granules derived from the cell inclusions and also from tick's eggs may develop into spirochaetes. With regard to the shedding of granules from the spirochaetes, they are considered to be of the nature of resistant spores and are probably to be observed in other species.

The author adds a few words on the nature of the granules in the organs of the tick, and having examined many species of Acarines does not agree with MARCHOUX and COUVY regarding their wide prevalence in this group. In one instance, however, granules were found in the eggs laid by some *Hyalomma aegyptium*, but in another lot of eggs from the same source two *undoubted* spirochaetes were also found, although the ticks that laid these eggs could not have fed on any animal suffering from spirochaetosis for a very long time. E. H.

* In this connection it is interesting to note that in Cambridge, in spite of numerous efforts, Professor NUTTALL has been unable to transmit *Babesia (Piroplasma) canis* from dog to dog by means of its invertebrate hosts, *Rhipicephalus leachi* and *R. sanguineus*.—E. H.

MAYER (Martin). Uebertragung von *Spirochaeta gallinarum* durch Milben. [The Transmission of *Spirochaeta gallinarum* by Mites.]—*Arch. f. Schiffs- u. Trop. Hyg.* 1914. Apr. Vol. 18. No. 7. pp. 254-255.

In the Tropical Institute at Hamburg the strain of *Spirochaeta gallinarum* is kept going in canaries. A canary that was injected with some other infection was found dead of spirochaetosis, and it was suspected that it had become infected by the agency of mites travelling from a canary infected with spirochaetosis, that had been kept in an adjoining cage.

Some of the well-fed mites found on the dead canary were placed in a cage with two fresh birds and after seven days one of the latter became infected and died of spirochaetosis.

It is uncertain whether the mites transmit the infection by their bites or through the birds swallowing them. These results clearly show that the canary mites, and probably also fowl mites, are capable of transmitting *Spirochaeta gallinarum*.

E. H.

MACFIE (J. W. Scott) & JOHNSTON (J. E. L.). A Note on the Occurrence of Spirochaetosis of Fowls in Southern Nigeria.—*Ann. Trop. Med. & Parasit.* 1914. Apr. 21. Vol. 8. No. 1. pp. 41-48. With 2 plates.

The authors record the presence of spirochaetosis in both fowls and ducks, near Lagos, Southern Nigeria. Notes on the symptoms of the disease and morphology of the parasite do not add anything new.

Three fowls were treated with injections of 3/50 gr. of atoxyl; two of the fowls recovered, in both cases the parasites disappearing after the first injection, but in the third individual, although three injections were given at three-day intervals, the parasites never disappeared and it succumbed to the infection.

Two fowls were treated with injections of 0.002 gm. of salvarsan. Each of the birds was cured by three injections, but in one case the parasites did not disappear until the third day after the first injection.

The "after-phase" bodies of Balfour, although looked for carefully, were not observed.

E. H.

LAUNOY (L.) & LÉVY BRUHL (M.). Le Sang de la Poule dans la Spirillose expérimentale.—*Ann. Institut Pasteur.* 1914. May. Vol. 28. No. 5. pp. 517-539. With 1 coloured plate.

The present article is a more detailed account of the results of the authors' investigations of the changes in the blood of fowls infected with spirochaetosis, and reviewed in this *Bulletin*.

The authors' conclusions are as follows:—

(1) Infection of the adult fowl with *Spirochaeta gallinarum* produces in that animal a very rapid and well-marked anaemia, the number of red cells sometimes being lowered by one half in five days. From a haematological point of view this is the most characteristic phenomenon. By its intensity and certain characters of the anaemia (polychromatophilia, augmentation of the globular value) fowl spiro-

chaetosis resembles the so-called pernicious anaemias, but it is distinguished by the rapid recovery, which is complete ten days after the crisis.

(2) This anaemia, and the recovery from it, is accompanied by variations in the leucocytes which evolve in a constant cyclical manner.

These results are shown in the following table, which apply to experiences obtained with a fixed virus (*i.e.* one which had been passed by inoculations through a number of fowls), but the infection following the bite of an infected *Argas* (first passage), although it was a little more severe, produced similar changes in the blood cells.

Day of the Infection.	Clinical Evolution.	Red Cells.	White Cells.
1 to 2	Incubation.	Commencement of anaemia.	Leucocytosis of polynuclears with rods.
3 to 5	During attack.	Progressive fall in number.	Leucocytosis of neopoly-nuclears.
5 to 6	Crisis.	Maximum anaemia (50 per cent.)	Leucopenia.
6 to 10	Convalescence.	Rise in number.	Leucocytosis of mononuclears.
6 to 10	Recovery.	Normal.	Normal, or sometimes slight leucocytosis with the normal formula. Sometimes prolonged mononucleosis.

(3) The spleen does not seem to play any part in the production of these modifications of the blood. Its removal is not followed by any alteration in the haematological evolution of the disease, outlined above.

In a footnote to the article it is stated that LAUNOY and DEFAIX, under certain conditions, have been able to keep *S. gallinarum* for at least four months in the ice-chest, without the parasite losing its virulence.

E. H.

TAYLOR (J. A.). **Bronchial Spirochaetosis in Uganda, with Pneumonic Symptoms.**—*Ann. Trop. Med. & Parasit.* 1914. Apr. 21. Vol. 8. No. 1. pp. 13-18. With 2 charts.

Several cases of pneumonia presenting unusual features were observed by the author in the Entebbe Civil Hospital, and also elsewhere in Uganda. These cases were all among natives, but the definite and constant symptoms and the finding of a large number of spirochaetes in the sputum of two recent cases make it possible that the condition may be caused by the extension of these parasites along the air passages. The history and course of the disease is as follows:—

"For a few days the patient has a cold, but otherwise feels well and is doing his ordinary work. More or less suddenly a headache develops, with some photophobia, and complaint is made of pains in the limbs and various parts of the body, but especially about the chest. The patient feels hot and begins to expectorate sputum streaked with blood. He passes a rest-

less night, the pain and constant coughing preventing sleep, and in the morning appears to be in such a serious condition that his friends think he is about to die, and bring him to the hospital. On admission the case appears, at first sight, to be one of typical pneumonia of several days' duration, and it is difficult to believe that the patient felt well and was doing his ordinary work on the previous day. The temperature varies between 102° and 104° , pulse 120 to 140, respirations 25 to 40. The cough is troublesome and a quantity of typical, tenacious, rusty-coloured sputum is expectorated. The patient complains of headache and pain in the chest, chiefly behind the sternum. On examination of the chest, sometimes nothing definite can be determined, but more often fine crepitations are heard posteriorly over a small and well defined area in the inferior lobe. In the cases I have seen, only one (the right) lung has shown any signs of being affected. Usually neither dulness nor bronchial breathing can be made out with certainty. The patient remains in the same condition from a few to forty-eight hours, when the temperature suddenly falls to sub-normal, and he feels comparatively well and makes an uninterrupted recovery without any relapse. The sputum remains rusty for perhaps thirty-six hours after the fall of temperature, then gradually becomes more like that of an ordinary cold and continues for a week or ten days in diminishing quantities."

The author then describes two cases in detail, in addition giving temperature charts.

Numerous spirochaetes were found in the sputum of the patients examined, and the total disappearance of these parasites within a few days, and the fact that the decrease in their numbers synchronized with the abatement in symptoms, is very strong evidence in support of the view that they are the causative agents of the disease.

[Bronchial spirochaetosis seems to be widely distributed in the tropics, for it has been recorded from Ceylon, the West Indies, the Philippine Islands, Sudan, and now from Uganda.]

E. H.

HARPER (Frank S.). **Bronchial Spirochaetosis.** *Jl. Trop. Med. & Hyg.* 1914. July 1. Vol. 17. No. 13. p. 194.

The author briefly describes a case which came under his notice at Tamale, Northern Territories, Gold Coast. The patient complained of cough, wasting, profuse expectoration which had never been blood-stained, and had been ill about six months. On examination of the sputum numerous spirochaetes were found, and the author is of the opinion that this was a case of chronic bronchial spirochaetosis which had followed an acute attack. This, the author believes, is the first case of this infection reported from West Africa.

E. H.

SLEEPING SICKNESS.

STARGARDT. *Syphilis und Trypanosomiasis (Schlafkrankheit)*.—*Dermatol. Wochenschr.* 1914. *Ergänzungsheft zu Band 58 (Festschrift)*. pp. 112-132.

Comparisons of syphilis and trypanosome infections have frequently been made. Dourine has often been likened to syphilis and general paralysis to sleeping sickness, at least in so far as their morbid anatomy is concerned; furthermore the interstitial keratitis of hereditary syphilis is very similar to that due to trypanosomiasis. The correspondence of the two diseases is, however, much deeper than was at first thought, and in this paper the author discusses the clinical and pathological similarities. Such correspondence is found from the beginning to the last stages of the infections.

Recent observations have shown that frequently there is some local reaction at the site of the bite of an infective insect; this has been called the "trypanosome chancre." What period elapses between the bite and the appearance of the local lesion is not yet definitely settled, but by some observers it is given as a few hours. There is a certain amount of experimental evidence supporting the view that the trypanosome chancre results from a local multiplication of trypanosomes. The work of SCHUBERG and BÖING is referred to in this connection (see this *Bulletin*, Vol. 2, p. 126). When rat's blood heavily infected with nagana was injected under the conjunctiva in rabbits a general infection soon followed, and the local reaction was not to be distinguished from that resulting from a natural infection of the disease. If on the other hand only a few trypanosomes were injected under the conjunctiva, little nodes of inflammatory thickening, very similar to the primary syphilitic affection of the conjunctiva, appeared before the trypanosomes were found in the blood. The author explains the fact that these primary lesions have not yet been observed in natives by the suggestion that they, as a rule, only come under observation a considerable time after infection has occurred, and that such furuncles might readily be overlooked or quickly forgotten by the native.

Reference is made to the transmission of sleeping sickness by coitus. KUDICKE has recorded a number of such cases in women who lived in Glossina free districts and who contracted the disease from infected men. Stargardt suggests that it would be of interest to determine whether primary lesions were to be observed in these cases.

Similarly, in the second stage of syphilis and trypanosomiasis a like correspondence is noticeable. The spirochaetes and trypanosomes enter the blood stream and multiply. There is the same general and painless enlargement of the lymphatic glands. Sometimes, especially in natives, the skin rashes resemble very closely those of syphilis; such a case is described by RINGENBACH (see this *Bulletin*, Vol. 3, p. 35). The histological findings in the skin lesions of both diseases are similar; they are the result of multiplication of the parasites in the tissues. The author considers it worthy of remark that neither the spirochaetes nor trypanosomes wander at random into any tissue whatsoever, but at a definite time they seek out by preference a certain tissue: thus, when they have multiplied to a certain extent in the blood of the freshly infected animal, both invade by preference the skin.

Again in the later stages of syphilis and sleeping sickness there are many resemblances, side by side with, of course, many differences. The late syphilitic lesions may be divided into gummatous and non-gummatous lesions; the latter comprise such lesions as general paralysis, tabes, optic neuritis and the joint affections in general paralysis and tabes. Only these non-gummatous lesions have their counterpart in trypanosomiasis. Stargardt lays stress on the point that it is only when the parasites have escaped into the tissues that these lesions result. He inoculated guinea-pigs with *T. evansi*; not the slightest change was observed in the retina—either with the ophthalmoscope or on post mortem examination—even when the blood vessels of the retina contained as many trypanosomes as red blood cells; it was only when there was active invasion of the tissues of the eye that inflammation of the retina was noticed. Exactly the same holds true of the brain; so long as the trypanosomes remain in the blood vessels there are no inflammatory lesions in the brain. The idea that the inflammatory lesions are due to toxins formed by the trypanosomes in the circulating blood is dependent on the fact that the parasites have not been demonstrated in the brain of sleeping sickness patients. This failure, however, is one of technique and due to want of proper fixing immediately after death. WOLBACH and BINGER (see this *Bulletin*, Vol. 1, p. 132) demonstrated the existence of trypanosomes in the brain of monkeys exhibiting well marked nervous symptoms. It is to be remarked that the sites in which these authors found the trypanosomes are similar to those in which NOGUCHI demonstrated the presence of *Spirochaeta pallida* in general paralysis. Embolism of the capillaries by trypanosomes does not, in the author's opinion, play any part in the production of symptoms, because neither in sleeping sickness nor in general paralysis are the parasites numerous enough to cause a real obstruction of the vessels. The symptoms due to embolism produced experimentally by infecting mice and guinea-pigs with *T. evansi* are quite different. Mice may suddenly fall dead and guinea-pigs develop characteristic apoplectic seizures. Details are given of a number of such observations.

The variation of the symptoms in both general paralysis and sleeping sickness are dependent on the different localisations of the organisms in the central nervous system.

Further resemblances between syphilis and trypanosomiasis are found in the lesions of the eyes. Iritis and irido-cyclitis are met with in both syphilis and sleeping sickness. In all the inflammatory lesions of the eyes the parasites can be demonstrated in the tissues. Stargardt refers to the various lesions which have been described by different workers and contrasts them with those described in syphilis. The author examined the manner in which the trypanosomes invade the tissue by observing the parasites in a piece of cornea from a nagana infected dog with commencing keratitis.

In spite of the many resemblances between sleeping sickness and syphilis there are however definite differences, of which the principal concerns hereditary transmission. This is exceedingly common in syphilis, but appears never to occur in sleeping sickness. Stargardt found that the foetuses of mice and guinea-pigs heavily infected with *T. evansi* were sterile. Section of the placenta revealed enormous

numbers of parasites in the blood vessels of the maternal portion, whilst those of the chorionic villi were free from trypanosomes. It is very striking that the same trypanosomes which can penetrate the uninjured conjunctiva cannot pass the thin membrane of the chorionic villi. NATTAN-LARRIER's theory that the freedom from infection of the offspring is due to antibodies derived from the mother is criticised on the ground of the histological findings in the placenta, and on the fact that antibodies could hardly be present in the maternal blood in view of the enormous swarms of parasites encountered. Again there is no reason to believe that the foetus itself is able to form antibodies, as newly-born animals are readily susceptible to infection. There is no well authenticated case of hereditary transmission of human trypanosomiasis from mother to child.

The paper closes with a brief discussion of the affinities of *Spirochaeta pallida*—whether it belongs to the bacteria or to the protozoa.

W. Yorke.

MARTIN (Louis), DARRE (Henri) & DUMAS (Julien). **Sur un Cas de Fièvre Intermittente Trypanosomiasique causée par un Parasite Atoxyl-Résistant.**—*Bull. et Méms. Soc. Méd. des Hôpît. Paris*, 1914, July 9. Vol. 30. No. 24. pp. 49-60. With 2 charts.

This is a report of a case of sleeping sickness which presented certain peculiarities both from the clinical and therapeutic points of view. Clinically the affection was characterised by a regularly periodic intermittent fever; the disease was the result of a trypanosome which was atoxyl resistant. The patient contracted infection near Bangui (probably), in French Congo.

A detailed clinical account of the case is recorded. The attacks of fever, which recurred at intervals of 8 to 10 days, were accompanied by a moderate degree of splenomegaly. At the commencement of these attacks, which have been repeated for some months, examination of the blood revealed the presence of numerous trypanosomes; during the intervals it was impossible to detect them. The exacerbations of fever have persisted in spite of regular atoxyl treatment in 0.5 to 1.0 gm. doses; the silver arsenical preparation of DANYSZ was equally inefficacious. Intravenous injections of potassium emetic associated with subcutaneous injections of atoxyl resulted, however, in a prolonged remission which still persists.

Guinea-pigs infected with the trypanosome by subinoculation from a monkey (patas), which had been infected directly from the patient, were treated with large doses of atoxyl with no result. Other guinea-pigs were subinoculated from the first and some days later received a dose of atoxyl; in spite of the treatment trypanosomes appeared in their blood without any prolongation of the incubation period.

In this case it was quite impossible to cause definitive disappearance of the trypanosomes from the blood of the patient, in spite of the largest doses of atoxyl which could be administered without exposing the patient to the risk of grave toxic effects. The atoxyl resistance of the strain was absolute.

W. Y

SCHLEICH (Rudolf). **Klinischer Beitrag zur Psychose bei Trypanosomiasis.** [Clinical Contribution on the Psychoses of Trypanosomiasis.]—*Inaugural-Dissertation zur Erlangung der Doktorwürde in der Medizin, Chirurgie und Geburtshilfe unter dem Präsidium von Professor Dr. Gaupp.*—1914. 48 pp. Tübingen: Verlag von Franz Pietzcker.

This paper, which is a thesis for the degree of Doctor of Medicine, deals with the psychoses met with in sleeping sickness. The clinical history of a case of human trypanosomiasis and the pathological findings are given in great detail.

The author observed well-marked psychoses in two cases of sleeping sickness; this is in accordance with the more recent literature and shows that mental disturbances may be expected in this disease. Reference is made to MENSE's handbook on tropical diseases, pointing out that the mere exhibition of psychical disturbances is not sufficient to distinguish between trypanosomiasis and general paralysis. The author writes:—

1. In the course of sleeping sickness the sudden appearance of mental symptoms should be looked for in every case.

2. In forensic cases medical experts should always consider, in crimes committed by individuals who may be suffering from trypanosomiasis, the possibility of acute trypanosomiasis psychosis.

3. In patients in the third stage of sleeping sickness there always exists the possibility that in consequence of the sudden appearance of psychic disturbances they may become homicidal or suicidal. In looking after such cases it is therefore necessary to take precautions so that they can at any time be placed under restraint.

W. Y.

KUHN (Philaethes). **Die Schlafkrankheit in Kamerun.** [Sleeping Sickness in Kamerun.]—*Medizinische Klinik.* 1914. July 5. Vol. 10. No. 27. pp. 1131-1135. With 1 sketch map.

This paper gives a sketch of the condition of sleeping sickness in Kamerun. There are at the present time in Kamerun four separate sleeping sickness regions, viz.:—(1) the Mbo-Ebene district; (2) the region of the upper Njong and upper Dume; (3) the Sanga-Ubangi district; and (4) the country of the Ivindo or Aina. The author gives a brief account of the disease in each of these four areas.

As a result of his observations Kuhn strongly suspects that the disease is smouldering in remote regions of the Protectorate, and he entertains the fear that, given favourable circumstances, it will burst into flame just as in the large known foci of the disease.

The remainder of the paper is taken up with a brief description of the measures which are adopted to combat the disease in the four districts mentioned above.

A map is given showing the position of the four chief centres of the disease.

W. Y.

ALLARD. **La Maladie du Sommeil au Mossi en 1906.**—*Ann. d'Hyg et Méd. Colon.* 1914. Apr.-May-June. Vol. 17. No. 2. pp. 479-482.

Sleeping sickness at Mossi* is stated by the natives to have been

* To the north of the Northern Territory of the Gold Coast.

known for a long time and there are histories of old epidemics. Besides isolated cases the disease progresses by terrible paroxysms, which coincide with the rainy season, and during which entire villages disappear. As a result of enquiries it would appear that the last great epidemic dates back 15 or 20 years. The disease spread from the south towards the north-west. The natives state that there has not been a true epidemic since the country was taken over by the Europeans; this the author regards merely as a coincidence, as the presence of the Europeans at Mossi has not altered in any way the distribution of the water courses nor resulted in any attack on Glossina.

Biting flies exist in great numbers, especially on the banks of the streams; the natives exercise great care to avoid building their villages near the banks of the Volta, which is at the present entirely deserted. The natives avoid the swamps, firstly, because of the pernicious effects which they attribute to humidity, and secondly, because the biting flies attack their cattle.

The author continues by giving an account of the ravages of the disease. Occasionally an attempt is made by the natives to treat the disease, especially the muscular feebleness. They have recourse to a plant (*Pélaga* or *Vilouviga*) which is made into a paste and rubbed all over the body. An infusion of the same plant is given as a draught. The results are generally nil. Nothing is done to the cervical glands except the scarification which the natives perform for all kinds of maladies.

A clinical account is given of a few cases which came under the author's personal observation.

W. Y.

LAFONT (A.) & DUPONT (V.). **Sur les Résultats Eloignés du Traitement de la Maladie du Sommeil par le Ludyl et le Galyl.**—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 640-647.

Further details are given of the cases of sleeping sickness treated by the authors with ludyl and galyl (see this *Bulletin*, Vol. 2, p. 353). Of the 34 patients 15 are dead and 19 survive and are in apparent good health. Four of the 12 survivors who have been examined at the laboratory still show parasites; the most minute examination of the remaining 8 has not revealed the presence of trypanosomes. The authors give the following results:—Cured 44 per cent., surviving but not cured 19 per cent., surviving and in whom no trypanosomes can be found 37 per cent. Of 5 patients who were in a very advanced stage of the disease when treatment commenced all are dead; of the 15 who were in an advanced stage 9 are dead and 6 survive; of the 2 who were in a moderate condition both survive; and of the 12 who were treated at an early stage of the disease only 1 is dead, 3 are in apparently good condition but present trypanosomes, 5 show no parasites and 3 are in a good state of health but have not been examined for trypanosomes regularly.

Administration by ingestion or by intramuscular injection of a suspension in oil do not give good results; the best method is intravenous injection. It is to be hoped that by studying the proper spacing and size of the doses, the length of time required for treatment, the alternation of the products, etc., better results will be obtained.

In a later communication the authors will furnish data of the results of treating other cases of sleeping sickness with these drugs. W. Y.

LAVERAN (A.) & ROUDSKY (D.). *Sur un Dérivé du Diaminoarsénobenzène.*—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 593-596.

A derivation of diaminoarsenobenzol, prepared by OECHSLIN and referred to as O_1 , was handed over to LAVERAN in order that its therapeutic value in trypanosomiasis might be examined.

As regards therapeutic properties the new product resembles closely arsenophenylglycin, but it possesses very appreciable advantages. Its preparation is relatively easy and it is less costly than arsenophenylglycin, a fact which is of considerable importance in the treatment of large animals. Again O_1 is much more stable than arsenophenylglycin: it is a light yellow powder very soluble in water and keeps well in sealed tubes even when they contain a little air; aqueous solutions keep at least 8 days in sealed ampoules containing very little air.

The drug is less toxic than arsenophenylglycin; a healthy mouse of 20 gm. tolerates 10 mgm., whilst mice of the same weight are killed by 8 mgm. of arsenophenylglycin. Infected animals are much more susceptible to the drug than healthy animals. In practice not more than 5 mgm. should be given to a mouse of 20 gm., 5 cgm. to a guinea-pig of 500 gm. and 25 cgm. to a dog of 10 kgm. Repeated doses of O_1 can be given without danger. Solutions of the drug (4 per cent. in distilled water) should be given intravenously; if administered subcutaneously, painful oedema and even cutaneous gangrene may result. Sterilisation in the autoclave increases the toxicity of the drug. Solutions should be filtered before intravenous injection.

The action of the drug on mice, guinea-pigs and dogs infected with *T. brucei*, *T. gambiense*, *T. rhodesiense*, *T. dimorphon* and *T. congolense* was found to be much the same as that of arsenophenylglycin. The parasites disappeared from the blood of mice heavily infected with *T. brucei*, *T. rhodesiense* or *T. dimorphon* some hours after a subcutaneous injection of the product, and cures were obtained after a single injection of 5 mgm. or after three injections of 2 to 3 mgm. It was easy to produce the disappearance of trypanosomes from the peripheral circulation of guinea-pigs and dogs, but it is not yet known if relapses will occur and in what proportion of cases.

A guinea-pig infected with a strain of *T. gambiense* resistant to atoxyl was successfully treated with the new product.

W. Y.

RUSO (Canio). *La Chemioterapia dell'Antimonio nella Trypanosomiasi sperimentale.* [The Treatment of Experimental Trypanosomiasis by Antimony.]—*Annali d'Igiene Sperimentale.* 1914. Vol. 24. (Nuova Serie). No. 2. pp. 353-373. With 18 diagrams.

The author refers to previous work on the therapeutic action of antimony in trypanosomiasis by THOMSON and CUSHNY (*T. brucei*), PLIMMER, FRY and RANKEN (*T. evansi*), and ROWNTREE and ABEL (*T. gambiense*). He also mentions the experimental findings of KOLLE, HARTOCH, ROTHERMUNDT and SCHÜRMANN in their treatment of experimental trypanosomiasis by trixidin (see this *Bulletin*, Vol. 2, p. 351). As infective material the author used nagana (Prowazek

strain), and his object was to obtain in rats a complete and lasting sterilisation by means of a single dose. The substances used were two in number, antimony trioxide of Kahlbaum and the metallic antimony of Merck. A large number of diagrams showing the results of treatment is given. The conclusions are :—

1. Metallic antimony has a better sterilising action in trypanosomiasis than trixidin, although hypodermic injections of it cause infiltration followed by necrosis in 20 per cent. of rats treated.

2. The drugs are lethal in doses of 100 mgm. per 10 gm. body weight.

3. Subcutaneous injection of 0.0005 gm. of trixidin produces definite cure.

4. Subcutaneous injection of 0.00025 gm. of trixidin is of value as a prophylactic, even when the rat is inoculated 24 hours after.

5. Trixidin *per os* in the dose of 0.05 gm. has a trypanocidal effect.

6. Metallic antimony injected in the dose 0.0004 gm. under the skin produces an unquestionable curative effect.

7. Metallic antimony in the dose 0.00006 gm. subcutaneously acts as a preventive.

8. Metallic antimony is useful *per os* in the dose of 0.005 gm.

9. The administration of metallic antimony in the form of lozenges is impracticable, because the animals after a few days refuse to eat them.

W. Y.

Russò (Canio). *Ricerche Chemioterapiche della Tripoflavina A e dell'Optochinum Basicum nella Tripanosomiasi Sperimentale.* [Researches on the Chemotherapy of Trypoflavin A and Basic Optochin in Experimental Trypanosomiasis]—*Malaria e Malat. d. Paesi Caldi.* 1914. May-June. Vol. 5. No. 3. pp. 162-179. With 8 diagrams.

Trypoflavin is one of a number of colouring substances derived from acridin; it is the only one of these which possesses trypanocidal activity. The drug does not colour the tissues of the animal except at the point of injection, and the discolouration lasts only a few days. The author found that the drug both *in vitro* and *in vivo* exercised a sterilising effect on *T. brucei*. He carried out experiments, details of which are given, to show the effects of temperature upon the trypanocidal activity of trypoflavin A. He also observed the effects of the drug in the treatment of rats, using it both as a curative injection and also prophylactically. The conclusions are :—

1. Trypoflavin A exercises *in vitro* an energetic sterilising action (1 in 1,200,000) on *T. brucei*.

2. This trypanocidal action has a direct relationship to the time and temperature.

3. Administered subcutaneously the drug does not colour the skin or tissues; it is more organotropic than parasitropic and has a relatively high toxicity.

4. Hypodermic injection of .005 to .025 gm. per 20 gm. of body weight caused in rats acute poisoning.

5. Doses of .0001 gm. to .0025 gm. are sufficient for a lasting internal disinfection.

6. Doses of .00025 gm. to .00012 gm. do not kill trypanosomes *in vivo* and the infection is always fatal.

7. The production of antibodies is combined with the destruction of the parasites by trypoflavin A, and the phenomenon of immunity lasts 20 to 30 days.

8. Injections under the skin of .00025 gm. to .00012 gm. are inactive from a curative point of view, but effectual prophylactically.

9. Trypoflavin A, given simultaneously with and in combination with basicoptochin, displays an energetic sterilizing action against trypanosomes.

W. Y.

RITZ (H.). **Ueber einige Grundprinzipien der Chemotherapie.** Zugleich eine Erwiderung auf den Artikel von L. Brieger und M. Krause in dieser Wochenschrift, 1914, Nr. 3). [On some Fundamental Principles of Chemotherapy.]—*Berlin Klin. Wochenschr.* 1914. No. 20.

This paper does not record any further experimental observations. It is a rejoinder to the last article of BRIEGER and KRAUSE [see this *Bulletin*, Vol. 3, p. 249], who had criticised the unfavourable results obtained by RITZ and LEUPOLD in the treatment of experimental trypanosomiasis by tryposafrol and novotryposafrol.

In conclusion the author writes that, if their results are in direct opposition to those of BRIEGER and KRAUSE, they must leave the decision to the examination of other workers. They do not intend to repeat their investigations as, after two years' work, the exact chemical constitution of the remedies is still unknown.

W. Y.

OEHLER (Rud.). **Der Dimorphismus des *Trypanosoma brucei* bei experimenteller Behandlung.** [The Dimorphism of *T. brucei* in Experimental Treatment.]—*Zeitschr. f. Hyg.-u. Infektionskr.* 1914. June 24. Vol. 78. No. 1. pp. 188-192.

This paper is a continuation of a previous one on the dimorphism of *T. brucei*, where the author showed that the broad varieties are remission forms and the slender varieties exacerbation forms [see this *Bulletin*, Vol. 3, p. 539]. In the present paper the author refers to two conditions in which, by experimental treatment, relapses were produced and more or less numerous broad forms made their appearance. The origin of the strain with which these experiments were conducted (BRAUN and TEICHMANN St. 63) is given in the previous paper.

In the first series of experiments relapses were produced in mice by placing them in an incubator. It was found that mice tolerate a temperature of 35° C. quite well if supplied with water; the rectal temperature remains unaltered at 36° C. to 37° C. Temperatures of 38.5° C. are quickly fatal to mice, but this was hardly ever reached in infected animals kept in the incubator at 35° C and consequently the course of the disease was not interfered with. The author distinguishes mice of the 1st to the 10th passage after inoculation from guinea-pigs from those of later passages. The course of the disease in the former is chronic and is similar to that in guinea-pigs; death occurred in from 20 to 70 days, and in the majority of cases there were remissions, during which the trypanosomes completely disappeared from the blood. In these spontaneous remissions the number of broad forms was considerably increased. If such mice, showing more or less numerous trypanosomes in the blood, are placed in the incubator, remissions, with the appearance of broad forms, are observed with great regularity in from two to three days. After 10 passages in mice kept at room temperature the infection becomes acute and monomorphic, whilst, on the other hand, in mice which have been kept in the incubator the infection remains chronic, remittant, and dimorphic. After 20 or 30 passages death occurred in the mice kept at room temperature in from six to eight days without any remissions. The trypanosomes present were for the most part intermediate forms, but

there were also some slender forms. Only about one per cent. of broad forms were observed. Of those kept in the incubator at 35° C. only about half died from acute infection, and in the remainder the disease is sub-acute or chronic. Death occurred in from ten to twenty days; remissions and a corresponding increase of broad forms were observed in 30 per cent. of cases.

In a similar manner remissions can be produced by drug treatment. It was found, however, that after treatment by such drugs as salvarsan and tartar emetic the remissions were not accompanied by an increase in the number of broad forms. Possibly those drugs which cleared the trypanosomes from the blood in from six to eight hours acted too quickly, as with more slowly acting remedies, such as atoxyl and parafuchsin, broad forms made their appearance.

A further method of production of remissions is by simultaneous infection with the spirochaetes of relapsing fever. Mice which had been infected with *T. brucei* (St. 63) the previous day were inoculated with spirochaetes; trypanosomes appeared in the blood and increased in numbers, but on the appearance of spirochaetes remissions occurred. Frequently after the disappearance of the trypanosomes the spirochaetes also disappeared and there was a considerable protraction of the course of the disease.

As a result of his work Oehler concludes that the broad forms of the chronic nagana strains have nothing to do with sexual differentiation, but that they are the forms which the trypanosome assumes during remissions when the parasites are disappearing from the blood.

W. Y.

SCHILLING (Claus) & SCHRECK (Hans). *Trypanosomen-Studien.*—*Arch. f. Protistenkunde*. 1914. July 6. Vol. 35. No. 1. pp. 1-23. With 19 text figs.

The first portion of this paper deals with the morphological characters of various strains of East African animal trypanosomes. The following strains were examined:—(1) *St. Ferox* of EHRLICH; (2) *St. Punda* from a chronically infected donkey; (3) *St. Kirundia* from a horse infected by *G. morsitans*; (4) *St. Gnu* from a gnu; (5) *St. Ngerengere*, obtained by feeding wild tsetse on guinea-pigs at Ngerengere; (6) *St. Glossina*, obtained by injecting the gut contents of wild tsetse flies into rats; (7) *St. Kibunga Rat A*, obtained by inoculating a rat with the blood of a reedbuck; (8) *St. Kibunga Mouse B*, obtained by subinoculation of a mouse from St. 7; (9) *St. Kibunga Rat C*, obtained from St. 8 after several passages through rats; (10) *St. Kibunga Rat D*, the twentieth passage of St. 9 in rats; (11) *St. Kibunga Mouse E*, inoculated from St. 10; (12) *St. Kibunga Rat F*, obtained by passing St. 7 through 19 rats and two guinea-pigs.

Morphological details of each of the above 12 strains are given. Four biometric curves—100 trypanosomes seem to have been measured in each case—have been constructed from each strain dealing with the following points:—

(1) The distance between the posterior end of the parasite and the blepharoplast. (2) The distance between the posterior extremity and the middle of the nucleus. (3) The distance between the blepharo-

plast and the middle of the nucleus. (4) The total length of the trypanosome including the flagellum.

Regarding the first strain, the authors remark that the nucleus generally lies in the region between the middle and posterior thirds of the body. The blepharoplast is sometimes at the posterior end, very frequently close to it. The parasite is rather monomorphic; 60 per cent. of the individuals are from 19 to 22μ long; there are only very few short and long forms. In St. 2 the forms encountered varied in length between 13 and 29μ ; the nucleus of the longer forms is near the middle of the body. In 13 per cent., however, the nucleus was situated near the blepharoplast. In St. 3 the parasites varied in length from 16 to 31μ ; posterior nuclear varieties were encountered. In St. 4 chiefly short forms (65 per cent.) were encountered; in 18 per cent. the nucleus was situated near the blepharoplast. In St. 5, 74 per cent. of the parasites were 20μ or less in length; a number of long forms, however, of 32 microns in length were encountered. Posterior nuclear forms were also met. In St. 6 short forms preponderated; in 25 per cent. the nucleus was situated close to the blepharoplast. In St. 7 the forms met with were between 16 and 28μ in length. In St. 8 mostly short varieties with a large proportion of posterior nuclear forms were encountered; in 68 per cent. of the trypanosomes the distance between the blepharoplast and the middle point of the nucleus was less than 4μ . In St. 9 intermediate forms preponderated; the distance between the nucleus and the blepharoplast varied from 2 to 10μ . Strain 10 showed some short forms in which the nucleus lay near the blepharoplast. In St. 11 only a few short forms in which the nucleus and blepharoplast were close together were seen. In St. 12 examinations were made at 3-day intervals. On the 6th day of the infection, besides many short and intermediate forms, a considerable number of long forms were present; three days later the latter decreased in numbers and by the 12th day had almost disappeared, short forms greatly preponderating. On the 18th day the intermediate type again appeared to multiply, and on the 21st day many long forms were present.

The authors next consider the value of the biometric curves from the point of view of the differentiation of trypanosomes. They consider the curves made by them on different animals infected with the Kibunga strain. The first curve made from Rat E is of a definite dimorphic type. The second curve shows a great similarity to those of monomorphic trypanosomes such as *T. vivax* and *T. uniforme*, distinguished only by the position of the curve, whereas the curve made from Mouse E is quite different from either of the other two. The authors come to the following conclusions:—

1. Measurements of the trypanosomes in one or several blood films from an infected animal do not suffice to determine to which species the trypanosome belongs.

2. Variations in length of the various parasites in the same species of animal and even in the same individual are very marked.

3. The differentiation of a species through measurements is only of value either when curves are made from all experimental animals and in all stages of the infection, or when the fluctuations in the various dimensions in the course of the infection are repeated almost exactly periodically.

Whilst all the above strains belong to the *brucei* group, another strain, which differs considerably from these, was obtained from an

infected mule; where the animal was infected is unknown. Guinea-pigs and rats were infected from the animal; 81 per cent. of the individuals were between 12 and 15 μ in length. The flagellum was short, the body plump, and even the longest forms had a thick body. It is probably identical with *T. congolense*.

The second part of the paper is concerned with *T. rhodesiense*. The authors write that "the type *rhodesiense* is not peculiar to human trypanosomes of Rhodesia and Nyasaland. It has been isolated from various animals infected in East Africa, e.g., Strains Punda, Kirundia, Gnu, Ngerengere, Glossina and Kibunga." KINGHORN, YORKE, BRUCE and others have found trypanosomes with posterior nuclear forms in wild animals in Rhodesia and Nyasaland. These authors hold that *T. brucei* and *T. rhodesiense* are identical. In order to examine further the question of the identity of game and human trypanosomes, the authors have injected animals with their *St. Kibunga* previously treated with normal human serum. The action of the serum proved to be preventive. Hence they conclude that a strain in which 16 to 44 per cent. of the trypanosomes exhibit posterior nuclear forms is not identical with the human trypanosome.

[It is not easy to follow the curves and diagrams in the earlier part of the paper.]

W. Y.

MESNIL (F.) & RINGENBACH (J.). *Sur le Trypanosoma rhodesiense et ses Affinités avec le Tr. gambiense. Quatrième Note.*—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 612-618.

Reference is made to the fact that a monkey (*Macacus*) immune to *T. gambiense* proved susceptible to *T. rhodesiense*, and also to the observation of LAVERAN that a goat immunised against *T. gambiense* succumbed to subsequent inoculation with *T. rhodesiense*. MESNIL and LEGER showed that mice cured of *T. rhodesiense* by means of arsenophenylglycin exhibited a fair degree of immunity to *T. gambiense*. All these observations indicate that the two viruses are distinct but allied species.

The observations recorded in this paper were made with a strain of *T. rhodesiense* obtained from the London School of Tropical Medicine from a patient (W.G.) who had contracted the disease in Rhodesia (see *Sleeping Sickness Bulletin*, Vol. 4, p. 19 and this *Bulletin*, Vol. 1, p. 274). The strain was isolated from the patient in 1912; the posterior nuclear forms are very rare and it is hence extremely difficult to distinguish from *T. gambiense*.

Experiments were undertaken with four goats, two having an acquired immunity for *T. gambiense* and two being normal animals. An immunised and a normal animal were inoculated with each of the two strains of *T. rhodesiense*—strain G and the original strain A, which has been kept two years in mice.

Goat B, previously immunised against *T. gambiense*, succumbed to infection with *T. rhodesiense* (Strain A) in 68 days; a normal goat B inoculated with the same strain died after 42 days. Goat C immunised to *T. gambiense* and subsequently inoculated with *T. rhodesiense* (Strain G) died after 53 days, whereas a normal goat C' inoculated with this strain lived for 60 days. The authors write that the two strains

of *T. rhodesiense* are very pathogenic for the goat in spite of many passages of the trypanosomes through rodents. The strains killed goats immunised against *T. gambiense*, but it is noteworthy that, in the case of virus A, the goat which had been previously immunised against *T. gambiense* lived considerably longer than the normal animal, but in the case of virus G there was but little difference between the course of the disease in the normal and in the immunised animals. These facts favour the conclusion that *T. gambiense* and *T. rhodesiense* are distinct.

On account of the rapid death of the goats, experiments on the protective power of their sera have given but little result. The sera of the two normal goats infected with the strain of *T. rhodesiense* did not show any activity against *T. gambiense*. The serum of goat B and of goat B¹ was active against *T. rhodesiense* (Strain A) but hardly at all against Strain G. Conversely the sera of goat C and C¹ was active against the virus G but not against virus A.

It was found that virus G was almost as sensitive to the preventive and curative action of human serum as virus A. The history of the patient shows that Strain G was much less susceptible to treatment by atoxyl than are infections by *T. gambiense*. MESNIL and LEGER have shown that atoxyl acts just as well on mice infected with virus A as with *T. gambiense*. This, however, was not found to be the case with virus G. It was resistant to atoxyl. Infected mice were, however, cured by arsenophenylglycin and by a closely allied substance prepared by OECHSLIN (see page 258).

W. Y.

OGAWA. *Etude Morphologique et Biologique sur Trypanosoma pecaudi.*

—*Ann. Inst. Pasteur.* 1914. July. Vol. 28. No. 7. pp. 677-691.

With 7 curves and 1 text fig.

The strain of trypanosomes with which the work described in this paper was done was brought from Dahomey by BOUER and has been maintained by passage through guinea-pigs at the Pasteur Institute since 1908.

Details of the course of the infection in 15 guinea-pigs and 10 mice are given. The duration of the disease in guinea-pigs was 8 to 24 days (average 16) and in mice 6 to 15 days. In 7 of the guinea-pigs there was a definite crisis between the 5th and 12th day; the crisis lasted from 1 to 3 days.

Long forms, short forms and intermediate forms were observed. Amongst the short forms a number of individuals were seen with the nucleus situated close to the blepharoplast; occasionally it was found to be actually posterior to the blepharoplast. There appears to be a certain relationship between the course of the infection and the appearance of the various forms. At the beginning of the infection long forms are met with, towards the middle of the disease short forms are seen in large numbers, whilst in the last stages the long forms again predominate. In those instances in which the infection runs a very rapid course the long forms are the most numerous throughout.

A series of experiments was undertaken to ascertain the effect of temperature on the parasites. Heavily infected blood from the heart of guinea-pigs was mixed with physiological citrate solution and kept at different temperatures for various periods. It was found that the

two forms were equally susceptible to the deleterious influences of different temperatures; it is not possible to separate one from the other by this means.

The serum of guinea-pigs bled at the time of the crisis possesses a protective action against experimental infection. When the serum is mixed with the trypanosomes *in vitro* the latter are agglutinated.

Attempts to cultivate the parasites on the Novy-Nicolle medium were unsuccessful.

W. Y.

RITZ (H.). Ueber Rezidive bei experimenteller Trypanosomiasis. [On Relapses in Experimental Trypanosomiasis.]—*Deut. Med. Wochenschr.* 1914. July 2. Vol. 40. No. 27. pp. 1355-1358.

This paper, which is of a technical nature, deals with the properties of relapse strains. The trypanosome employed was *T. brucei* (Prowazek). In mice the parasites multiplied until the death of the animal without any remissions or relapses. In order to produce a disappearance of the trypanosomes from the blood with a subsequent relapse, small doses of neosalvarsan were administered intravenously and, when all the veins were used up, subcutaneously. About 200 mice were repeatedly treated with small doses of salvarsan in this manner and details of the relapses in two of them are given in the form of curves. The animals were inoculated with the original strain and after the appearance of trypanosomes in the blood were incompletely cured so that the parasites disappeared from the blood stream temporarily. On their re-appearance they were again expelled by another small dose of the drug and so forth. The process was repeated in one of the mice 10 times and in a second 20 times. After the third and fourth relapses respectively all the succeeding relapse strains were subinoculated and maintained by passage through normal mice. In this manner a considerable number of relapse strains were obtained and their properties subsequently examined.

In his conclusions the author writes that the processes in experimental trypanosome infections are rather complicated. The great variability of parasites in the presence of immunising influences is certainly of considerable significance, not only in trypanosome infections, but also in all relapsing diseases, especially in relapsing fever and syphilis. It follows from these investigations that for practical purposes immunotherapy is only conceivable when the possibility of modification of the parasites is limited, so that new relapse formation due to the formation of polyvalent sera in the course of the infection is excluded, as is the case in recurrent fever. In trypanosome diseases and also in syphilis on the other hand but little is to be expected from efforts to bring about a cure through immunising processes. In these conditions results are only to be expected from chemotherapy. The paper, which is rather technical, should be consulted in the original by those interested.

W. Y.

BATTAGLIA (Mario). **Biologische Differentialcharaktere für einige Trypanosomen.** [Biological Differential Characters for some Trypanosomes.]—*Centrabl. f. Bakt.* 1. Abt., Orig. 1914. July 25. Vol. 74. No. 7. pp. 582-584.

The author discusses briefly the various means which have been adopted for the differentiation of trypanosomes. Morphology he considers to be of some value, but it is rather uncertain and unreliable. Natural immunity of certain animals to some trypanosomes and cross immunisation are of more importance. This criterion is not, however, infallible, as an example the author refers to the fact that guinea-pigs can sometimes be inoculated with *T. lewisi*. The agglutinins contained in the blood of certain immune or immunised animals for the corresponding trypanosomes are of some importance; this method, however, frequently fails because a serum may agglutinate a trypanosome and yet the animal become infected, and moreover the agglutinin may act on a whole group of trypanosomes and not on one alone. The ability to cultivate various trypanosomes on nutrient media, the method of development of the parasites, and the fact that others cannot be cultivated at all are of no value as a means to differentiation. Attempts to separate trypanosomes by means of precipitins meet with the same difficulties as in the case of agglutinins. It has been stated that some trypanosomes are parasites of vertebrates and others only of invertebrates; this statement is, however, very elastic and unreliable. The author considers that the susceptibility or insusceptibility of certain trypanosomes to drugs is unsatisfactory as means of differentiation. The value of biometric curves has been the subject of much discussion and of late has been severely criticised.

BATTAGLIA gives the results of numerous experiments extending over several years on the attempt to differentiate between *T. vespertilionis*, *T. lewisi*, *T. brucei*, *T. dromedarii* and *T. gambiense*. The course of the infections in rabbits was examined and special reference made to keratitis and ulcerative granulomata of the genitals.

T. vespertilionis is always pathogenic for rabbits, but does not cause keratitis. *T. lewisi* is not always pathogenic, but still it causes keratitis and ulcerative granulomata of the genitals. *T. brucei* is always pathogenic in rabbits, and frequently evokes progressive keratitis and hard ulcerative granulomatous nodules. *T. dromedarii* (a strain of *T. evansi*) is always pathogenic in rabbits, and frequently causes keratitis, which is, however, progressive and tends to resorption. It gives rise to ulcerative granulomata of the genitals, but these are not so hard and nodular as those due to *T. brucei*. *T. gambiense* rarely causes keratitis, but is always pathogenic for rabbits. When injected into the genital organs it provokes an oedematous condition but no granulomata.

In conclusion the author writes that by this method the above five trypanosomes can be clearly differentiated.

[Although Battaglia claims to have infected rabbits and guinea-pigs with *T. vespertilionis*, LAVERAN and MESNIL state that inoculations of mammals, other than bats, have given negative results, and LAVERAN groups *T. vespertilionis* amongst the non-pathogenic trypanosomes (see *Sleeping Sickness Bulletin*, Vol. 3, p. 359)].

W. Y.

MAYER (Martin) & DA ROCHA-LIMA (H.). *Zum Verhalten von Schizotrypanum cruzi in Warmblütern und Arthropoden.* [On the Behaviour of *Schizotrypanum cruzi* in Warm-blooded Animals and Arthropods.]—*Beihefte z. Arch. f. Schiffs- u. Tropenhyg.* 1914. June. Vol. 18. Beiheft 5. pp. 101-136. [pp. 257-292.] With 2 coloured plates.

After giving a brief history of the disease and its cause the authors record in detail the results of their experimental inoculations in animals at Hamburg. Mice and guinea-pigs were mostly used, but a number of monkeys, rats and rabbits were also inoculated. In monkeys the incubation period was 11-14 days and death occurred in 21-28 days. The course of the disease in guinea-pigs was generally chronic and in many instances recovery was noticed, but in others the infection was acute, terminating in death. No increase of virulence was found on passing the strain from guinea-pig to guinea-pig. In mice the disease was sometimes acute and sometimes chronic. The incubation period, which was at first 10-14 days, has fallen after many passages to about 6 days. At first only a small proportion of the animals died, now a great majority die in from 2-4 weeks. Only comparatively few rats were inoculated; infection occurred after 6-18 days. The animals recovered and were subsequently resistant. One rabbit was inoculated with the blood of an infected mouse, trypanosomes appeared in its blood after an incubation of about 14 days but soon disappeared; the animal proved to be immune to subsequent injections of virulent blood, and a mouse inoculated from it a year later did not become infected. The occurrence of late relapses is of interest; in one guinea-pig there was a relapse after a negative period of eight months. Rats, guinea-pigs and rabbits which recovered from infection generally proved to be immune, but the serum of such immune animals did not protect mice when injected either 24 hours before or, at the time of, inoculation. Complement absorption experiments with the serum of the experimental animals and the organ extracts of heavily infected animals showed no difference from the control experiments.

In the peripheral blood division forms were not seen; parasites, however, showing commencement of division of the nucleus, as already described by CHAGAS, were observed; sometimes leishmanial forms were noted.

The authors made a thorough investigation of the histological appearances of the various organs of infected animals. As a result of examining sections they found schizo-trypanosomes in the tissue cells as round parasites of a distinct size, often spindle-shaped through lateral pressure, which multiplied by repeated division, preserving their size and form. At the end of the development, when the last division has occurred, smaller individuals are visible which are quickly changed into trypanosomes; these soon leave the host cells and escape in the blood stream.

The normal development of the schizo-trypanosome in the organ cells did not appear to damage them in any way. Even the mechanical effects of the large masses of parasites are, at least in the muscle fibres, quickly and completely repaired. Toxic substances probably only

arise when the parasites are damaged for any reason. Damaged host cells always contain parasites which are morphologically changed and in which development has been interfered with. The general appearances and most probably the functional disturbances have no immediate relation to the multiplication of the parasites in the organ affected. A causative relation to the lesions only arises when the parasites undergo massive destruction, which leads to the destruction of the host cells and often, also, to pronounced inflammatory appearances. It is hence inadmissible to regard the demonstration of normally developing parasites as indicating anatomical changes and to draw from it the explanation of clinical appearances.

Animals of the same species, infected in a similar manner, and in which the disease runs the same clinical course, show, on histological examination of their organs, the greatest difference in the extent and severity of the lesions and also in the distribution of the parasites. The most severe lesions are found as a rule in muscles. The adipose tissue is, however, frequently the seat of marked degenerative appearances. The remaining organs on the other hand, although they frequently contain masses of parasites, show for the most part no changes.

The authors next record transmission experiments with various arthropods and refer to the development of *Schizotrypanum cruzi* in them. The development of the parasite in *Conorhinus megistus*, *Acanthia lectularia* and *Ornithodoros moubata* was followed in detail. Transmission through the bite of bugs and ticks was not determined with certainty in a large number of experiments. There are two questionable positive results.

A female *Conorhinus megistus* two years after infection, and numerous bugs 10 months after infection, excreted parasites in their faeces which were infective.

No development of *Schizotrypanum cruzi* occurred in *Stegomyia calopus* or in *Culex pipiens*.

Numerous experiments were undertaken to ascertain the therapeutic action of various substances on animals infected with the parasite. Quinine, trypanred, salvarsan, tartar emetic, parafuchsin, potassium iodide and sublimate were without action. Atoxyl had no effect on infected mice; on the other hand, it appeared to be of some slight value in monkeys. Trypasafrol seemed at first to exert beneficial action on mice which were fed on it for some weeks; still mice which had been treated for several months relapsed.

The paper is illustrated by two coloured plates depicting the parasites as they appear in the blood and tissues of the vertebrate hosts, and also in the alimentary canal and faeces of the bugs and ticks.

W. Y.

BRUCE (David), HAMERTON (A. E.), WATSON (D. P.) & Lady BRUCE.
The Food of *Glossina morsitans*.—*Proc. Roy. Soc.* 1914. Aug. 6.
Vol. B 88. No. B 600. pp. 41-42.

Five hundred flies caught in the proclaimed area of Nyasaland were killed by chloroform and the gut of each was roughly dissected out, smeared on a slide, fixed by osmic vapour and alcohol and stained by Giemsa. The flies were caught in the bush away from the paths. Only 30 females were used. Of the 500 flies 288, or 57.6 per cent., con-

tained recognisable mammalian blood; the type of cell was chiefly such as occurs in antelope. In only three cases were nucleated red cells found. Thus one per cent. contained nucleated blood and 99 per cent. mammalian. From measurements it seemed probable that the nucleated blood was avian, not reptilian. The length of the corpuscles was 10 and 10.5 microns and that of the nuclei 4.4 to 4.8 microns. It is suggested that the nucleus is the better guide, as being less altered by digestion. In no case was vegetable matter noted. Of the 30 females 43.3 per cent. contained mammalian blood. From experiments in the laboratory it was found that blood is recognisable in stained specimens for two to three days after a feed; hence it may be inferred that half the flies examined had fed within three days of their capture and that the flies feed naturally at least once every six days.

[KINGHORN, YORKE and LLOYD reported that of 82 *G. morsitans* caught in Rhodesia, which contained recognisable blood, in 85 per cent. it was mammalian and in 14 per cent. non-mammalian.]*

A. G. B.

NÖLLER (Wilhelm). *Die Uebertragungsweise der Rattentrypanosomen.*

II. Teil.—*Arch. f. Protistenkunde*. 1914. June 17. Vol. 34. No. 3. pp. 295-335. With 2 plates and 3 text figs.

The present paper contains an account of further work on the transmission of *Trypanosoma lewisi*, together with remarks on certain protozoal parasites of various fleas. With regard to *T. lewisi*, fleas become infected from newly-infected rats more easily than from chronic cases. While fowl-fleas can live for a week on rat blood, they do not act as transmitters, since they void little or no faeces when sucking. "Developmental forms" of the rat-trypanosome previously described by PROWAZEK, BALDREY and RODENWALDT can be seen without difficulty in rat-lice during the first week of the infection of the rat, but the rat-louse is not regarded as a true transmitter. Trypanosomes are voided with the faeces of the rat-louse; they are only found in the body cavity of the rat-louse when injury to the gut has occurred. Experiments with *Melophagus ovinus*, fed once on infected rat blood (and afterwards on clean rats), showed that *T. lewisi* could live for two days in the insect when kept at 25° C.; after that the trypanosomes disappeared.

Apart from *T. lewisi*, other parasites of various fleas, both observed by Nöller and recorded by others, are briefly described. *Leptomonas ctenocephali* was found also in the larvae of dog fleas. *Malpighiella refringens* and *Nosema pulicis* were seen in dog fleas. The *Nosema* (which is figured) was present in about 6 per cent. of the dog fleas examined in Munich. In fowl-fleas and pigeon-fleas a *Leptomonas* was found. *Legerella parva* (a Coccidian, of which figures are given) was present in the Malpighian tubes of adult fowl and pigeon fleas. *Actinocephalus parvus* (a Gregarine) was found in the gut of all the larval fleas investigated.

H. B. Fantham.

PRINGAULT (E.). *Cimex pipistrelli*, Jen., Agent de la Transmission de la Trypanosomiase des Chauves-souris.—*Compt. Rend. Soc. Biol.* 1914. June 5. Vol. 76. No. 19. pp. 881-883.

The first part of the paper deals with the various attempts made in the past to determine the transmitter of the trypanosome (*T. vespertilionis*) of the bat. Attempts to transmit the parasite by fleas, lice and ticks had previously all failed. NICOLLE and COMTE in Tunis had found fleas and bugs present on infected bats. Pringault examining bats captured in the neighbourhood of Oued Miliane and of Maxula Radès (Tunis) found the same condition. A nest of 19 bats (*Vesp. kuhli*) was captured and 118 ectoparasites were found in the nest and on the bats. 89 were bugs. Emulsions of some bugs in salt solution showed numerous trypanosomes.

Bats in which no trypanosome was seen in 8 daily examinations were considered normal. Five such bats were placed in contact with 45 bugs. Four of the five became infected, trypanosomes appearing in the circulating blood between the 27th and the 72nd hour after contact with the bugs. It is considered probable that the 5th bat had had a slight previous attack and so was immune.

Seven large bugs were crushed in 15 drops of physiological serum. Many trypanosomes were seen in the mixture examined ultramicroscopically, crithidial forms predominating. The mixture was injected subcutaneously to two bats. One bat, killed after 7 days, showed distended abdomen, hypertrophy of the spleen and large, fairly friable liver. It had abundant trypanosomes in the spleen, numerous forms in the liver, while trypanosomes were rare in the lungs and bone-marrow. The second bat died after seven days. Trypanosomes were found only in the blood.

The author concludes that the normal mode of transmission of *T. vespertilionis* is by the bug *Cimex pipistrelli*, and promises later an account of the evolution of the parasite in this bug.

H. B. F.

PRINGAULT (E.). Non-pathogénéité du *Trypanosoma vespertilionis* (Battaglia) pour les Animaux de Laboratoire.—*Compt. Rend. Soc. Biol.* 1914. June 5. Vol. 76. No. 19. pp. 883-884.

The present paper gives an account of the author's unsuccessful attempts to infect mice, guinea-pigs and rabbits with *Trypanosoma vespertilionis*. Intraperitoneal inoculations of good cultures of the trypanosome on NNN medium were given, large quantities of the culture being employed. Repeated blood examinations showed no trypanosomes and no lesions were found when the animals were killed. The author concludes that, in spite of the large quantity of culture injected, he could not infect his laboratory animals, so that the trypanosome was not pathogenic for them.

H. B. F.

LAVERAN (A.) & ROUDSKY (D.). **Contribution à l'Etude de la Virulence du *Trypanosoma lewisi* et du *Tr. duttoni* pour quelques Espèces animales.**—*Bull. Soc. Path. Exot.* 1914. June. Vol. 7. No. 6. pp. 528-535.

Reference is made to the work of ROUDSKY which showed that it was possible to render *T. lewisi* pathogenic for mice and *T. duttoni* pathogenic for rats (*Sleeping Sickness Bulletin*, Vol. 3, p. 81 and Vol. 4, p. 126).

The authors give details of a number of inoculations of small rodents, including various species of rats and mice, and guinea-pigs with *T. lewisi* and *T. duttoni*. From these experiments it follows that intraperitoneal inoculation of small rodents such as field-mice (*Mus sylvaticus* and *Arvicola agrestis*), dormice (*Myoxus nitela*), *Meriones shawi*, *Gerbillus hirtipes*, *Jaculus orientalis* and guinea-pigs, with the blood of rats heavily infected with *T. lewisi* provokes as a rule infections of variable intensity. Sometimes trypanosomes are scanty and disappear after 24 to 48 hours and sometimes there is an infection characterised by phases of multiplication of the parasites, during which the multiplication forms of the trypanosomes are numerous, and by persistence of the parasites in the blood. Even in abortive cases, provided the animals acquired an immunity to *T. lewisi*, one can say that there was a true infection and not a mere passage of the trypanosomes in the blood.

In rodents other than rats inoculations "en série" of *T. lewisi* do not succeed, but from a consideration of their observations on the experimental infections of various species of rats and mice the authors conclude that it would not be very difficult to obtain strains of *T. lewisi* adapted to them, by the method by which they succeeded in rendering *T. lewisi* inoculable "en série" in the mouse and *T. duttoni* inoculable "en série" in the rat.

W. Y.

BROWN (Wade H.). **Morphological and Developmental Anomalies of a Pathogenic Strain of *Trypanosoma lewisi* and their Relation to its Virulence.**—*Jl. Experim. Med.* 1914. June. Vol. 19. No. 6. pp. 562-569. With 2 plates.

The author refers to the work of WENDELSTADT and FELLNER on the passage of *T. lewisi* through cold-blooded animals. The strain used by him was pathogenic and showed an unusual increase in virulence [see this *Bulletin*, Vol. 3, p. 542]. Equal binary longitudinal fission and, more rarely, unequal binary and multiple fission were encountered. Rapid multiplication with great numbers of irregular forms, especially small and imperfectly developed trypanosomes, is characteristic of an acute infection which occasionally terminates fatally at the height of multiplication. Sometimes with a normal rate and type of multiplication that period of the life cycle does not cease at the usual time, but continues on through the second or even the third week of infection, characterising a more severe but slowly progressing type of infection which may end fatally after the second week.

Small forms, 7μ to 8μ long, were found in some severe infections, and were comparable to the small infective forms from the invertebrate transmitter. Trypanosomes with elongate posterior extremity were seen, sometimes pointed, sometimes with a small bulbous extremity. On the other hand, the blepharoplast appeared almost terminal at times. In a few specimens suggestions of myonemes were seen.

Total absence of a stainable nucleus occurred in a few specimens, resulting from a typical division.

Blepharoplastless *T. lewisi* occurred spontaneously in either young or early multiplication forms with no evidence of degeneration or mechanical distortion.

The pathogenic strain of *T. lewisi* used has been inoculated into 82 rats. Most of the trypanosomes showed the anomalies of development and morphology mentioned above. A control strain, at first benign, was carefully examined, but subsequently showed increased virulence in certain series of infections coincident with the appearance of anomalous forms of trypanosomes in the blood of infected rats. The author states in conclusion that: "It could not be definitely determined to what degree these characteristics were co-ordinated with the virulence."

The author's summary is as follows:—

"1. The morphological and developmental anomalies of a pathogenic strain of *Trypanosoma lewisi* have been described to show the unusual character of the strain.

2. Especial attention is called to the spontaneous occurrence of ablepharoplastic forms of *Trypanosoma lewisi*.

3. It is pointed out that morphological anomalies were most pronounced in infections that showed unusual conditions of multiplication and that such infections usually proved severe.

4. Finally, an appreciable correlation between the morphological and developmental characteristics and the virulence as manifested in these examples of infection with *Trypanosoma lewisi* has been suggested."

H. B. F.

CARINI (A.) & BOTELHO, Junior (C.). Sur quelques Trypanosomes d'Oiseaux du Brésil.—*Bull. Soc. Path. Exot.* 1914. May. Vol. 7. N^o. 5. pp. 395-398. With 3 text figs.

The authors give a list of the Brazilian birds previously found to harbour trypanosomes. Such birds are rare. They have only found three birds parasitised out of many examined.

1. Trypanosome of *Piaya cayana macrura*—dimorphic, slender forms and flattened stout forms were seen. Blepharoplast nearly terminal. Dimensions and sketches are given.

2. Trypanosome of *Batara cinerea*—dimorphic, rather like the parasite recorded in the preceding case. Sketches are given.

3. Trypanosome of *Pitangus sulphuratus maximiliani*. Two parasites only were found; they were rather alike, but one was slightly shorter and flatter than the other. Blepharoplast ovoid and subterminal. The parasites are figured and detailed dimensions are given.

H. B. F.

MATHIS (C.). *Evolution d'un Trypanosome dans le Liquide Salivaire d'un Moustique.*—*Compt. Rend. Soc. Biol.* 1914. July 10. Vol. 77. No. 24. pp. 297-300. With 2 figs.

The author reviews briefly the records of the occurrence of flagellates of Culicines, which parasites are peculiar to the insects. He then states that he has found flagellates in a single smear of the salivary fluid of a *Culex* sp. captured in the open at Hanoi, and that he believes that the mosquito behaves towards certain species of trypanosomes as a true host. The flagellates under investigation were found only in the salivary fluid and not in the stomach, intestine or Malpighian tubes of the host. Two forms were present in a smear of the salivary glands:—(1) crithidial forms, separate or in rosettes; (2) forms typical of trypanosomes. Isolated crithidial forms were 21μ to 23μ by 1.8μ to 3.5μ . They had a thin undulating membrane. The flagella in rosettes were centrally directed, yet the author considers them to be multiplicative rosettes [and not agglomerative.] Oval and spherical forms were also found. The trypanosome forms were 10μ to 15μ long by 1.8μ to 2.8μ broad. In the greater number, the flagellum was close to the body and showed few undulations.

The author believes the crithidia and trypanosomes to belong to the evolutionary cycle of some vertebrate trypanosome. He has found them in one *Culex* only, though a very large number of mosquitoes from the same neighbourhood have been examined. The supposed vertebrate host is unknown. Attempts at infecting mosquitoes with *Trypanosoma annamense*, the causal agent of the "surra" of Indo-China, have all failed. The most plausible hypothesis seems to be that a bird trypanosome is connected with these Culicine flagellates. The supposed evolution of the trypanosome in the mosquito is believed to take place only in the saliva.

[The possibility of a mixed infection of two distinct flagellates does not appear to have been entirely excluded.]

H. B. F.

PELLAGRA.

- SILER (J. F.), GARRISON (P. E.) & MACNEAL (W. J.). i. **A Consideration of Certain Foods and of Proximity to a Previous Case as Factors in the Etiology of Pellagra.**—*Proc. Soc. Experim. Biol. & Med.* 1914. Feb. Vol. 11. No. 3. p. 94.
- ii. **Further Observations of the Thompson-McFadden Pellagra Commission upon the Epidemiology of Pellagra. (Abstract).**—*Proc. New York Pathol. Soc.* 1914. Feb. New Series. Vol. 14. No. 2. pp. 55-56.

A statistical study of the foods used and of the occurrence of pellagra in six villages, among about 5,000 persons, failed to reveal any consistent relationship between the use of any particular food and the occurrence of pellagra. Statistical study showed that the disease spread from an antecedent case as centre. The authors consider their results are only consistent with the view that pellagra is an infectious disease.

H. MacLean.

- MARTINI (E.). **Pellagraforschung in den Vereinigten Staaten und die "Simulium"-Theorie.** [Researches on Pellagra in the United States and the Simulium Theory.]—*Beihefte z. Arch. f. Schiffs- u. Tropenhyg.* 1914. June. Vol. 18. Beiheft 5. pp. 178-191. (pp. 334-347). With 7 curves.

The writer holds that the best work on the subject of pellagra is now being carried on in the United States, and suggests that a disease among the Red Indians, described about A.D. 1600, was probably pellagra. He praises the Report of the Thompson-McFadden Commission [see this *Bulletin*, Vol. 3, p. 303].

He emphatically believes that the *Stomoxys calcitrans* must be suspected as an insect carrier rather than any *Simulium*. Of 227 pellagrins, half had been bitten by *Stomoxys*, hardly a room in the cotton mills was free from this fly and in the mill villages they were present in 97 per cent. of the houses, while in town houses there were only 50 per cent. Moreover, in Barbados, where pellagra is very prevalent, *Stomoxys* is common, while *Simulium* could not be found. He is no believer in the maize theory, for he points out that in Spartanburg (N. Carolina) cases continue to occur after the diet of the family has been changed. Partly because pellagra is rare in quarters of the town which are sewered and is common where the houses are provided with unprotected "privies," he agrees with the conclusions of the 1913 Commission that neither maize nor *Simulium* are the cause of pellagra, but that a more probable cause is either *Stomoxys* or another fly. "Pellagra is an infectious disease *sui generis*, spread, especially in a household, by contagion or by the excreta of pellagrins."

F. M. Sandwith.

- SAMBON (L.). **La Pellagre.**—*Bull. Acad. Méd. Paris.* 1914. Séance du 30 Juin. Vol. 71. (3 ser.). No. 26. pp. 897-903.

In this lecture the author runs rapidly over the history of pellagra and states that the disease is not contagious from man to man, but infectious by means of insects. Instead of incriminating only the

Simuliidae, he now includes as possible vectors the "Chironomidae" and the "Ceratopogoninae," flies "whose natural history is still but little known."

He complains that believers in the maize theory will state that pellagra discovered in the British Isles cannot be true pellagra because maize is not eaten there. [This objection does not seem yet to have been made.] He finds from his own observations that the incubation period may be as short as 15 days or even less. He complains that medical men in France do not seem to be interested in pellagra, though he has recently met with it in the Pyrenees and he believes that it exists in other parts of France.

F. M. S.

WEISS (Ettore). *Die Pellagra in Südtirol und die staatliche Bekämpfungsaktion*. [Pellagra in South Tyrol and the Government Methods of fighting it.]—*Oesterreichische Sanitätswesen*. 1914. May 7. Vol. 26. No. 19. pp. 309-331.

The Inspector of pellagra in Innsbruck gives us a valuable resumé of the elaborate Government methods for trying to prevent it.

He believes that the disease appeared at the same time as it did in Italy and he has found a record of "salt disease" in 1786, by which he thinks pellagra was meant. The Austrian Government in 1815 published popular instructions on the subject, and he claims that in Tyrol the earliest prophylactic and curative measures were introduced. So early as 1833 the Venetian Government issued instructions for pellagrins and for the maize market. In 1898 the pellagra asylum at Rovereto was opened and in 1904 a law was enacted dealing with pellagra, of which the various provisions are quoted.

1. Improvement of food in workmen's eating houses and in schools.
2. Creation of ovens and store houses for drying maize. Unfortunately the peasants preferred to use the ovens for drying their silk cocoons.
3. A system for exchanging good maize for damaged maize was proposed but not universally carried out.
4. Bakeries were found successful in towns. Now maize is not eaten, except in some isolated farms where home-made bread still consists of one third maize and two thirds wheat or rye flour.
5. At the Rovereto Asylum, during the last three years, 149 to 168 pellagrins were admitted annually.
6. Doctors were paid to visit pellagra districts.
7. Popular education was carried out by voluntary workers.
8. A statistical department created in 1904 met with the assertion that pellagra had diminished, but figures showed that it had increased since 1895. A fall then began from 8,053 cases in 1904 to 3,503 in 1912.
9. Among these conspicuous in their anti-pellagra labours were Professor MERKS, Dr. von PROBIZER and Mr. SCHINDLER, a Director, who wrote on maize as a diet.
10. Improvements in agriculture and hygiene.

The author considers that the maize theory holds its own, and finds that pellagra distribution follows bad harvests, while the diminished cases, quantitatively and qualitatively, coincide with the improved food supply and a cessation of exclusive maize diet. The peasant still eats *polenta* two or three times a day, but it is now yellow and no longer grayish-white, and he has additional food. Recent measures include courses of domestic economy for women, and they are encouraged to keep poultry and to use garden produce [see this *Bulletin*, Vol. 3, p. 302.]

F. M. S.

FUNK (Casimir). **Prophylaxe und Therapie der Pellagra im Lichte der Vitaminlehre.** [Prophylaxis and Therapy of Pellagra in the light of the Vitamine Theory.]—*München. Med. Wochenschr.* 1914. Mar. 31. Vol. 61. No. 13. pp. 698-699.

A plea for the acceptance of the theory that, like beriberi, pellagra is a deficiency disease. In districts where the disease is common the food is deficient in the necessary "vitamine," and in localities where maize forms the staple article of diet the deficiency is directly due to the removal of the exterior of the grain by milling. The part left is deficient in vitamine and so pellagra results. Whole rice, potatoes, fresh fruit and milk are advocated as a preventive and cure for pellagra.

H. M.

GOLDBERGER (Joseph). **The Etiology of Pellagra. The Significance of Certain Epidemiological Observations with Respect thereto.**—*U.S. Public Health Rep.* 1914. June 26. Vol. 29. No. 26. pp. 1683-1686.

The writer draws attention to the well known fact that attendants upon pellagrins do not contract the disease, although many chronic lunatics develop it after confinement in an asylum for ten or more years. He considers that the exemption enjoyed by nurses, attendants and employees is due to their having a more varied diet, even when their rations are supposed to be the same as those of the lunatics.

He is satisfied that the incidence among poor rural inhabitants and the rarity among poor townfolk is due to the superior diet of the latter. He urges that the dietary of those among whom pellagra is most prevalent should be improved and that in the Southern States, fresh meat, eggs and milk should be substituted for "cereals, vegetables and canned foods, that enter to so large an extent into the dietary."

F. M. S.

SILER (J. F.), GARRISON (P. E.) & MACNEAL (W. J.). **The Relation of Methods of Disposal of Sewage to the Spread of Pellagra.**—*Proc. Soc. Experim. Biol. & Med.* 1914. Feb. Vol. 11. No. 3. pp. 94-95.

The spread of pellagra takes place most readily in communities in which unscreened surface privies are used. Where a water-carriage system of sewage disposal exists, cases of pellagra are rare.

H. M.

SILER (J. F.), GARRISON (P. E.) & MACNEAL (W. J.). With the collaboration of A. H. JENNINGS, W. V. KING, V. C. MYERS, M. S. FINE, O. S. HILLMAN and Others. **Pellagra. First Progress Report of the Thompson-McFadden Pellagra Commission of the New York Post Graduate Medical School and Hospital.**—iv + 148 pp.

The papers forming this Report have already been reviewed in this *Bulletin*, see Vol. 2, p. 477 and p. 482; Vol. 3, p. 303, pp. 309-310.

F. M. S.

RAYER (P.). Pellagra. [Translation from Rayer's Atlas of Skin Diseases, 1835.]—*New Orleans Med. & Surg. Jl.* 1914. Apr. Vol. 66. No. 10. pp. 718-730.

Dr. R. WILLIS's translation ought to be read by all interested in the subject and especially by those who feel impelled to write a paper directly they have met with the disease.

Rayer quotes an author (Aug. SPSSA) who wrote that pellagra, when endemic, is only seen among those who inhabit stables and escape from winter cold by passing their spare time in cow houses. This is interesting to those who now consider that the stable fly may be a carrier. Treatment 79 years ago included: "upon the first symptoms of pellagrous affection, the patient ought to change his habits and occupation, or at least abstract himself from the influence of the causes which appear to have occasioned it."

F. M. S.

SWIFT (E. W. D.) & BROWN (H. Egerton). Some Cases of Pellagra occurring among the Insane in South Africa.—*Med. Jl. of S. Africa.* 1914. Mar. Vol. 9. No. 8. pp. 174-176. With 2 figs.

The authors state that Dr. M. M. MACFARLANE attended five cases of pellagra among Basutos in 1906-07 and ascribes the cause to the maize being reaped that year in very rainy weather, and having been stored in a damp condition. Instead of appearing in the spring and summer it is said to occur in South Africa in the late autumn and winter. Two cases are reported of a Basuto and a Zulu, both males; in the former it was the fourth attack, while in the latter it was the second. During the last eight years six cases presenting pellagrous symptoms have been observed among the native patients in the Bloemfontein Asylum. The typical pellagrous eruption, with subsidence and subsequent recurrence of the rash, has usually been accompanied by diarrhoea and progressive debility of mind and body. [The reviewer saw two cases of pellagra among the lunatics on Robben Island in 1900.]

F. M. S.

DYER (Isadore). Changing Views on Pellagra.—*Jl. Cutaneous Diseases including Syphilis.* 1914. Feb. Vol. 32. No. 2. [Whole No. 377]. pp. 111-112.

This is a brief editorial calling attention to the most common theories of causation. The writer believes that "the dermatologist especially has the opportunity to bring about some of the evolution of ideas in the disease." [It is necessary sometimes to remember that pellagra is no more a skin disease than are syphilis, tuberculosis and leprosy.]

F. M. S.

HARRING (E. R.). Pellagra.—*New Orleans Med. & Surg. Jl.* 1914. Mar. Vol. 66. No. 9. pp. 673-677.

This is a short record of the first case which the author met with in Louisiana. Since then 14 other cases have been reported within a radius of four miles.

F. M. S.

EVANS (J. E.). **Some Observations on Pellagra.**—*Southern Med. Jl.* 1914. June. Vol. 7. No. 6. pp. 483-485.

The author states on very insecure evidence that "pellagra is an infectious spirochetosis, closely allied to syphilis, but in all probability of very much longer period of incubation, extending perhaps, over many months."

F. M. S.

PEREZ (George V.). **Pellagra.** [Correspondence.]—*Brit. Med. Jl.* 1914. Mar. 14. p. 624.

Pellagra is unknown in the Canary Islands where the staple food is "Gofio," prepared from oats by roasting the grain, grinding and then mixing into a paste with water. To-day a mixture of equal parts of wheat and maize is first roasted and then ground. The author attributes the freedom from pellagra in these islands to the roasting of the grain by which process, he assumes, the injurious element is destroyed.

H. M.

WESTON (William). **Pellagra in Early Childhood.**—*Amer. Jl. of Diseases of Children.* 1914. Feb. Vol. 7. No. 2. pp. 124-139. With 5 figs.

The author has examined the leading works on diseases of children published in the United States and Great Britain without finding any mention of pellagra. With regard to Italy he says "we are aware there are hundreds of cases of pellagra in infants." He does not state whence he derives this information, but he says "nearly all the Italian pellagrolologists who mention children call attention to the fact that infants born of pellagrous mothers are under weight and that a large percentage of them die before reaching the fifteenth month; among the more common causes of death are gastro-enteritis, bronchitis, broncho-pneumonia and eclampsia. Despite this apparently unfavourable outlook, there are authorities who state that if the baby is early changed to the breast of a strong, healthy wet-nurse and removed from the endemic area, the child will not only escape the disease but will grow and develop normally." After communication with "about 100 physicians" acquainted with pellagra, the author considers there have probably been 15 cases in children under four years of age, in the township of Columbia, which has a population of 65,000. The youngest case from this town was five and a half months old. He says a great many cases were reported between 4 and 10 years of age. "One orphanage reported 57 cases of pellagra out of a total population of 215, the average age being 10, the youngest 5 years. In a small area . . . 11 cases have occurred, ranging in age from 15 months to 6 years." Incomplete notes or photographs are provided of five cases occurring between the ages of five and a half months and four and a-half years, and most of the children seem to have been breast-fed by their mothers, at least one of whom was pellagrous.

Under the heading of treatment the author recommends "that nurslings, either with or without the suspicion of having pellagra, should usually be weaned from pellagrous mothers. Not only should

a change of diet be ordered for such infants, but in view of our uncertainty as to the real cause of the malady, a change of environment should be ordered or, if this is not possible, patients should be placed in the best hygienic surroundings." [Breast-fed infants contracting pellagra and dying of "marasmus," unless the diet is changed, will remind the reader forcibly of a possibly analogous case, the "infantile beriberi" of the Philippines.]

F. M. S.

FRAZER (Thompson). **The Tongue and Upper Alimentary Tract in Pellagra.**—*Jl. Amer. Med. Assoc.* 1914. Apr. 11. Vol. 62. No. 15. pp. 1151-1153. With 2 text figs.

The author considers that dermatitis should be regarded as one of the least important symptoms of pellagra for the purposes of diagnosis. Cases of diarrhoea occurring as part of the spring or summer attack should be regarded with suspicion. Other symptoms of importance are those of the upper part of the digestive system, loss of appetite, dyspepsia, pyrosis and sore mouth, which frequently persist during the cold months. Stomatitis lasting over two weeks occurring in spring or summer is commonly encountered. The lips are dry, the mucous membrane is unduly red, aphthae occur on the gums, which are tender. The "stippled" tongue shows papillae at the tip and anterior portion; the tongue is also characterised by shedding of epithelium and may be completely stripped. Fissuring of the tongue is a marked symptom and if it is associated with enlargement, tremulousness and partial or complete epithelial denudation, pellagra may be suspected.

H. M.

FRAZER (Thompson). i. **The First Symptom in Pellagra.**—*Southern Med. Jl.* 1914. July. Vol. 7. No. 7. pp. 532-534.

ii. **Report of a Case of Pellagra with Late Skin Lesions.**—*Jl. Amer. Med. Assoc.* 1914. June 20. Vol. 62. No. 25. p. 1964.

These are superficially written papers, pointing out that it is not always the skin lesions which are the first symptoms. In the case reported a woman had been ill for seven months before the disease was suspected.

F. M. S.

HARRIS (Seale). **The Digestive Symptoms of Pellagra.**—*Southern Med. Jl.* 1914. July. Vol. 7. No. 7. pp. 525-530.

The author has come to the conclusion that many early cases of pellagra can be diagnosed by digestive symptoms, and that change of diet and improvement of home hygiene are valuable preventives. He tells a tragic story of a bank cashier who for four years had suffered from mild diarrhoea, sore mouth and burning pain in the epigastrium. In June, 1910 he was exposed, while driving, to the sun for many hours and then developed for the first time a typical eruption. He was placed in a darkened room for four weeks, his skin lesions vanished, but on return home he had to drive six miles in the heat of the day. His symptoms all returned with increased melancholia and he committed suicide by cutting his throat with a penknife.

The author finds, after the Ewald test breakfast, that three fourths of his patients show a deficiency or absence of free hydrochloric acid. The treatment he recommends is rest in bed for four weeks or several months in a darkened but well-ventilated room, nitrogenous food, bismuth, salol and dilute hydrochloric acid with pepsin.

[This is a more practical paper than most which have to be read on the subject.]

F. M. S.

HATIEGAN (Julius) & DOERI (Adalbert). **Beiträge zur Symptomatologie der Pellagra.** [The Symptoms of Pellagra.]—*Wien. Klin. Wochenschr.* 1914. Apr. 16. Vol. 27. No. 16. pp. 464-467.

The authors consider that altered stomach functions play a large part in the etiology of the disease. From a careful study of ten cases in Hungary, most of which suffered from diarrhoea, and by examining stomach contents and faeces, they found a diminution of pepsin and gastric mucus, with a slightly increased mobility of the stomach. Their conclusions are:—

1. Achlorhydria or hypochlorhydria of the stomach is an early and constant symptom.
2. The function of the pancreas is apparently unaltered.
3. Substitution by drugs of the missing enzymes of the stomach is justified at every stage of the treatment.

F. M. S.

STEWART (Charles E.). **The Probable Identity of Pellagra and Sprue.** *Trans. xvii Intern. Congress of Med.* London. 1913. Sect. xxi. Trop. Med. & Hyg. Pt. 2. pp. 125-133.

The writer believes that "we are not justified in considering sprue and pellagra as two distinct and separate diseases." But he frankly states that he has only had the opportunity of studying two cases of the former and three of the latter disease, apparently in Michigan. Many beginners before him have been struck with the similarity of the "bald tongue" in certain cases of both diseases, but the great difference of other symptoms has prevented them from writing on the subject. There are many cases of pellagra which show no skin lesions, but it is obvious that if the physician trusts only to these, he is rendered incapable of diagnosing pellagra during the many months of the year when they are not very obvious. Though both diseases are usually gastro-intestinal, the bulky, pale, fermenting stools of sprue are not seen in pellagra, unless the individual is suffering from both the diseases. Pellagra is also a cerebrospinal disease, while chronic sprue patients only show signs of mental irritability and obstinacy. The pathological lesions are quite different. The points of resemblance, some of which are mentioned by the author, are unknown etiology, alternating periods of exacerbation and comparative quiescence, dyspepsia, emaciation, tendency to relapse and indicanuria.

F. M. S.

ALLISON (Wilmer L.). **Report of Cases of Pellagra.**—*Texas State Jl. of Med.* 1914. July. Vol. 10. No. 3. pp. 123-125.

"This paper is simply the report of six cases of pellagra that recovered." They were apparently all treated in a "Sanitarium" and were thus removed from their home surroundings and home diet. All were given sodium cacodylate hypodermically in doses of 3 to 5 grains daily "for weeks and even months." The author claims to cure diarrhoea by giving dilute hydrochloric acid with the meals and finds that this acid is usually absent in pellagrous stomachs. He prefers a diet of milk, eggs and fruit to meat, and he insists upon the importance of keeping patients in bed, even for months. One demented patient, who had to be artificially fed for several weeks, had, upon recovery, no recollection of anything that had happened during two and a half years. Yet during this interval one of her children was born and her husband, a farmer, had twice moved his home.

F. M. S.

SYLVESTER (R. E.). **Pellagra.**—*Southern Med. Jl.* 1914. June. Vol. 7. No. 6. pp. 449-450.

The author states that he himself "has passed through the horrors of this deplorable disease." He recommends as treatment: absolute rest in a cool, dark room; a firm, kind nurse; a diet of juices made from apples, pine-apples, oranges and lemons, followed by buttermilk and eggs; daily colonic irrigation with two quarts of normal saline solution; cacodylate of soda in gradually increasing doses. In this way he has treated 35 bad cases in less than a year.

F. M. S.

DYER (Isadore). **The Treatment of Pellagra.**—*Texas State Jl. of Med.* 1914. July. Vol. 10. No. 3. pp. 117-123.

This dermatologist wishes to give the disease an alternative title—*Erythema toxicum epidemicum recurrens*. He mentions the various drugs which have been recommended by authors, mostly arsenical preparations. His own experience after treating nearly 100 cases during the last seven years is strongly in favour of "hydrobromate of quinin." To mild cases he gives from 2 to 5 grains thrice daily, while to severe cases he gives 10 grains every three hours, night and day for 4 or 5 days. He claims never to have lost a case and finds that large doses of quinine control the diarrhoea. He also finds useful calcium salts and gelatine. His general treatment is not new, except that he insists on the patient's being kept out of bed by day, and taking his exercise early in the morning or after sunset.

F. M. S.

ELEBASH (Clarence C.). **Treating the Gastro-Intestinal Tract in Pellagra.**—*Southern Med. Jl.* 1914. June. Vol. 7. No. 6. pp. 447-449.

This author believes that pellagra is a form of intestinal toxæmia and that it should be treated with "an abundance of green vegetables and fruit juices."

F. M. S.

WILLCOCKS (R. W.). The Occurrence of Pellagra in England.—*Practitioner*. 1914. July. Vol. 93. No. 1. (No. 553). pp. 106-112.

The author considers it of the utmost importance that English practitioners should become acquainted with the symptoms of pellagra. His own experience of the disease seems to be limited to one case, of which he furnishes notes. A girl of 14 years, who had never been away from London and its neighbourhood, was under treatment at Guy's Hospital and the Royal Waterloo Hospital, where a diagnosis of (?) cerebral tumour complicated by an acute lung inflammation was made. In July 1913, the patient developed skin lesions which sound like pellagra, and in September she was discharged. Among other non-pellagrous symptoms "there was double optic neuritis and commencing atrophy of the left eye."

F. M. S.

Ross (D. Maxwell). Notes on a Case of Pellagra.—*Review of Neurology. & Psychiatry*. 1914. June. Vol. 12. No. 6. pp. 244-249.

This is a doubtful case of pellagra which died in the Royal Edinburgh Mental Hospital. There was an autopsy, but "unfortunately the cord was not removed." The author suggests that some recent cases may be due to modern open-air treatment, combined with the asylum diet, which consists much more of rice and other cereals than the patients are accustomed to eat at home.

F. M. S.

RAINSFORD (F. E.). On a Case of "Pellagra" in an Insane Patient.—*Jl. Mental Science*. 1914. Jan. Vol. 60. No. 248. pp. 98-100.

The medical superintendent of the Stewart Institution claims to have had under his care the first pellagra case recorded in Ireland. A woman, at the age of 69, broke down mentally, and was sent to his asylum eleven months later. On July 9th, 1913, among other delusions she thought "that the Germans had landed, and that waggons of ammunition and cannons had gone along the road." A month later a rash resembling "an acute sunburn" appeared in the middle of the forehead, then the backs of the hands and wrists became acutely inflamed, red and swollen, then vomiting and diarrhoea occurred for four days. The knee jerks were absent, the patient was diagnosed by three physicians as pellagrous and she died on September 11th. [There is no record of an autopsy. It is difficult to know from the very brief notes whether this was a case of pellagra or not.]

F. M. S.

SPURGIN (W. H.). Acute Pellagra or Pityriasis rubra vel Dermatitis exfoliativa.—*Guy's Hospital Gaz.* 1913. Nov. 8. Vol. 27. pp. 443-446, and 1914. Jan. 31. Vol. 28. pp. 43-44.

A previously healthy clerk, aged 21, suffered from continued fever, and a diffuse general rash, at first papular, then vesicular and pustular, with profuse desquamation, "handfuls in the bed and on floor." The urine contained *B. coli* and "*B. staphylococcus aureus* yeasts." Six weeks after the onset of the illness, there was a discharge of stinking pus through openings in the skin, chiefly in the armpits and legs. The patient continued to desquamate from September to January, and was then able to walk about. [There is no reason for disagreeing with the skin specialist who saw the case on September 25th and decided that it was *not* pellagra.]

F. M. S.

- CESA-BIANCHI (D.). i. **Osservazioni cliniche e Ricerche sperimentali sulla Pellagra.**—*Clinica Medica Italiana*. 1914. Jan. Vol. 53. No. 1. pp. 35-58. With 12 figs. and Feb. No. 2. pp. 69-97.
- ii. **Sulla Presunta Reazione di Ipersensibilit  dei Pellagrosi.**—*Pathologica*. 1914. May 1. Vol. 6. No. 132. pp. 236-239.

These are detailed papers in connection with VOLTINO's belief that a reaction of hypersensitivity can be produced by the injection of a watery extract of bad maize [see this *Bulletin*, Vol. 1, p. 694.] Detailed and tabulated notes are given of 17 pellagrins, mostly from highly pellagrous families, who were subcutaneously injected with one, two or three doses each varying from one to two cc. of an aqueous extract of bad (and sometimes good) maize. Sixteen individuals showed a positive general reaction, such as slight rise of temperature, headache or diarrhoea, while the seventeenth person exhibited a slight local reaction, a blush and tenderness at the site of injection. There were also similarly injected 33 medical in-patients who were not pellagrous, with this result: 13 positive, 2 doubtful, and 20 negative reactions. Intraperitoneal injections of pellagrous blood serum gave mostly negative results, instead of the positive results claimed by VOLTINO and some other Italians. The author concludes that his research has not been able to prove a definite relation between maize and pellagra. No result was obtained when trying to discover in the blood serum of pellagrins the presence of specific antibodies such as haemolysins, precipitins and substances capable of fixing the complement.

F. M. S.

- NITZESCO (J. J.). **Les Ferments z inolytiques dans le Sang des Pellagreux.**—*Compt. Rend. Soc. Biol.* 1914. May 22. Vol. 76. No. 17. pp. 829-831.

Maize eaten soon after it is gathered is much less well assimilated and digested than when kept for two or three years, and animals fed with the recently gathered maize do not live as long as the others. HORBACZEWSKI attributes this toxicity to the oil and colouring substance of maize. If the protein of maize produces an intoxication, defensive ferments against zein may be expected in the blood of pellagrins. The blood of 48 pellagrins was examined by Abderhalden's dialysis method; the zein was extracted by alcohol from maize by Osborne's method. The reaction with ninhydrin was positive in all cases except those which were chronic and more than two years in hospitals. In these patients the only symptoms present are those of mental confusion. The controls on non-pellagrous peasants fed on maize were negative. With haricot flour, the reaction was negative in 14 pellagrins examined; with gliadin, 10 cases were negative, 4 uncertain.

The author concludes that specific zeinolytic ferments exist in the blood of pellagrins; that the production of these ferments is to be attributed to the penetration of zein from the intestine into the blood and that the ferments persist for a long time in the blood of pellagrins.

H. M.

- TIZZONI (Guido) & DE ANGELIS (GIOVANNI).** i. **Hauptcharaktere des Streptobacillus pellagrae als Anleitung zu seiner Identifizierung.** [Principal Characteristics of the Strepto-bacillus of Pellagra as a Guide to its Identification.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1914. June 13. Vol. 74. No. 3/4. pp. 219-224.
- ii. **Caratteri principali della Streptobacillus Pellagrae da servire di Guida per la Sua Identificazione—Malaria e Malat. d. Paesi Caldi.** 1914. Mar.-Apr. Vol. 5. No. 2. pp. 85-90.

These papers are identical and continue the authors' investigations already reviewed in this *Bulletin*, Vol. 1, p. 681 and Vol. 2, p. 486. Bacteriological details are given by which Type A can be distinguished from Type B and both can be differentiated from the ordinary strepto-bacilli of man and horse. The authors now wish to draw attention to the fact that they were able to study the transition phases of Type A cultures passing into Type B. It appears that cultures certified as Type A, obtained from a pellagrin in July, and passed four or five times through defibrinated rabbit blood, developed in November and December into Type B. The hypothesis is strengthened that Type B is only a feeble Type A. Type A has been found in both blood and faeces of pellagrins.

F. M. S.

- DEARMAN (W. A.).** **Some Views on the Etiology of Pellagra, based upon the Experimental Inoculation of Monkeys and Rabbits.**—*Southern Med. Jl.* 1914. July 1. Vol. 7. No. 7. pp. 519-525. With 8 text figs.

This paper is in continuation of a preliminary note (see this *Bulletin*, Vol. 2, p. 495). It appears that a monkey was given to swallow "a large piece of pseudo-membranous deposit, incorporated with saliva from a typical case of pellagra." After 37 days the monkey showed gradually these symptoms: anorexia, loss of spirits, emaciation, prostration, dysenteric diarrhoea, desquamation and exfoliation of the dorsum of hands and forearms." Also "the tail at the root was markedly erythematous and in a state of desquamation." Nineteen days after the onset of the symptoms death occurred. At the autopsy 12 hours later "the spleen was quite pale and indurated and showed signs of atrophy," the mesenteric vessels were engorged, "the intestinal tract showed signs of congestion and superficial necrosis." As might be expected in an experiment of this kind "a bacterium, closely allied to members of the colon group," was isolated, but the author could not succeed in producing the disease in other monkeys by injecting broth cultures intravenously, subcutaneously, intraperitoneally and intracranially. He then injected two rabbits with blood from pellagrous patients, and symptoms appeared nine days, and 23 days later "erythema, desquamation, exfoliation and pigmentation." He next experimented on a chicken which he caused to be bitten by 50 bed bugs "from a bed which a pellagrin had occupied for six months." After "about three weeks" the bugs died, while the chicken at the end of four months showed no lesions. Experiments were also made without success on rabbits, a monkey, chicken and mice with dog fleas, taken from "mangy dogs" owned by pellagrins.

F. M. S.

BARDIN (James). **Note on the Differential Blood Counts in Three Cases of Pellagra.**—*Old Dominion Jl. of Med. & Surgery.* 1913. July. Vol. 17. No. 1. 3 pp.

The author took the opportunity of examining the blood of three negroes in Virginia in July, when they showed marked skin lesions and seborrhoea on face and had severe diarrhoea, and again in November of the same year, when these symptoms were absent. His summary is as follows :—

"1. In the active stages of the disease there is a constant increase in the lymphocytes, large and small ; this increase is generally at the expense of the polymorphonuclear neutrophils.

"2. In the cases under review, there is a persistence of approximately the same blood-picture as in the active stages, after the other symptoms have practically disappeared.

"3. The persistence of the relative lymphocytosis probably has a prognostic significance, as indicating a probable recurrence of active symptoms with the return of the warm weather."

F. M. S.

MALARIA.

LALOR (N. P. O'Gorman). Investigation of Malaria in the District of Katha.—iii + 18 pp. With 2 maps, 2 coloured plates and a chart. 1913. Sept. Rangoon: Office of the Superintendent, Government Printing, Burma.

The localities in which malaria prevails in the province of Burma are divisible into three types:—(1) Low-lying marshy areas in the sea littoral; (2) Areas in the submontane jungles plentifully watered by perennial streams; (3) Low-lying swamps near the banks of large rivers.

The only feature common to all three is the presence of much rank and decaying vegetation in the water.

The town of Wuntho with its neighbourhood, the subject of this report, was selected as a type of the second class of locality. Malaria is very rife indeed; the percentage spleen rate in sixteen villages varied from 15.28 to 85. The district is large, hilly and sparsely populated, and lies for the most part on the west bank of the Irawaddy. There is no time of the year when the irrigation cuts or the pools they give rise to are not full of stagnating water, thereby affording exceptional facilities for the breeding of anophelines. Paddy cultivation *per se* appears to play a minor part in maintaining a water-logged condition of the soil.

In Wuntho itself some remarkable figures were obtained; for instance, the spleen rate for infants of 4 years of age is over 90, and at its lowest—in children of 5 years of age—does not fall below 60. This can only mean that in certain years the malaria is so intense that all the children become infected. In 1913 the fever season in Wuntho extended from April to December. In December, 1913, the endemic index of the population was 58 per cent.; the subtertian parasite played by far the greater part. The indigenous anophelines comprise the following species:—

SPECIES.	BREEDING PLACES.
<i>Myzorrhynchus barbirostris</i>	Shallow wells and other stagnant water.
<i>Myzomyia culicifacies</i>	Standing water and drains near the railway line.
<i>Myzomyia rossii</i>	Shallow pools.
<i>Myzomyia listoni</i> (var. <i>alboapicalis</i>) ..	Pools in river bed.
<i>Nyssorrhynchus fuliginosus</i>	Marshes below railway station.
<i>Neocellia willmori</i>	Larvae not found.
<i>Nyssorrhynchus maculipalpis</i>	Clear pools in river bed.
<i>Myzorrhynchus nigerrimus</i>	Marshes below railway station.
<i>Christophersia halli</i>	Larvae not found.

Barbirostris is by far the most numerous species; *listoni* is prevalent from late October to the end of May, *culicifacies* from late in February till June, *barbirostris* and *fuliginosus* from October to December and *rossii* in May. Of these *listoni* (var. *alboapicalis*) alone was found to act as a carrier, that is sporozoites were found on dissection in its salivary glands.

An attempt was made to ascertain the percentage of malaria-carrying mosquitoes infected by the midge *Ceratopogon ferox*, as well as by an acarine mite, and to determine the influence exercised by each of these parasites upon the malaria-bearing capacity of the anophelines

concerned. The *Ceratopogon* was present in Wuntho during the late October rains but was in no instance observed infecting the local species of anophelines. The acarine mite infested *Myz. barbirostris* and *N. fuliginosus*; as many as 25 specimens were found on a single specimen of *barbirostris*.

The usual preventive measures are recommended, though the author appears to ignore the ways and means by which any extensive measures may be instituted in such a primitive township as Wuntho seems to be.

P. H. Bahr.

SERGEANT (Edm.) & FOLEY (H.). *Exploration scientifique du Sahara Constantinois, Oued Rir'—Oued Souf* (Avril 1912).—*Bull. Soc. Path. Exot.* 1914. May. Vol. 7. No. 5. pp. 416-429. With 2 plates and 2 figs.

The districts named are quite dissimilar. Oued Rir' forms a basin 150 kilometers long, lying between Biskra and Touggourt. The altitude is very slight, some of the area being below the level of the sea. There are a large number of artesian wells from which water is conveyed to palm trees. In the neighbourhood of the oasis there are vast marshes; the soil is strongly impregnated with salt. One hundred kilometers to the east lies Oued Souf. This is an uninterrupted sea of high sand dunes. The inhabitants make great crater-like excavations, like the pits of ant-lions, going down as much as 12 metres, and put their palms in the bottom in the damp soil. Thus in Oued Rir' there is stagnant water everywhere, whilst in Oued Souf the water never comes to the surface.

The authors have made a comparative study of malaria in these two regions. In Oued Rir' the observations were made just before the annual epidemic. Many larvae and adults of the anopheline *Pyrethophorus chaudoyei* Theobald, were found; this mosquito can live in water containing a considerable amount of salt. The endemic index was studied by palpation of spleens and search for haematozoa, a blood smear being taken from each person examined. The proportion of hypertrophied spleens was higher than that of persons with parasites, which the authors say is the reverse of what one finds in the blacks in tropical regions; the population is negroid. The results are shown in tables. Of 900 natives examined 37, or 4.03 per cent. showed parasites and 84, or 9.15 per cent. had large spleens.

In Oued Souf no anophelines were found, and out of 240 persons examined only one was infected and had a large spleen; he had probably been infected in the course of a journey.

The rest of the paper deals with ophthalmia and tuberculosis.

A. G. B.

LEGER (Marcel) & ARLO (J.). *La deuxième Campagne antipaludique en Corse* (1913).—*Le Paludisme en Corse*. pp. 1-43. (Publication de l'Institut Pasteur. 1914. Laval: L. Barnéoud & Cie.

This report embraces a well-written account of malaria in Corsica, the special means adopted to eradicate the disease, and the outstanding topographical features of the malaria infested districts [see this *Bulletin*, Vol. 2, p. 215].

It is difficult from the small number of inhabitants examined in each locality to gauge the intensity of the infection, but in a series of 494 infants on the west coast the spleen rate was found to be 24.69 and the parasite rate 71 per cent. So intensely malarial are some of the villages on the east coast that during the fever season, that is from July to October, the inhabitants emigrate *en bloc* for the hills, deserting their homes and leaving behind only the very infirm and poor.

The subtertian parasite appears to be widely distributed in the island and to account for the majority of the infections. The results of quinine prophylaxis have so far been encouraging, especially amongst the gendarmerie. Mosquito nets being unknown in Corsica, the authors suggest that the Government undertake their free distribution to all officials.

Larvicidal measures have been adopted in a few localities; the authors consider that the success so far achieved warrants their continuation on a more extensive scale in face of the inborn apathy of the Corsicans to sanitary matters.

At Casabianda various engineering measures are in contemplation in order to dispose of the excess of drinking water the town enjoys; this waste water has provided numerous breeding places for anophelines. The encouragement of bats, as advocated by the authorities at Panama, is also under contemplation. During the summer of 1913 large shelters were constructed at Casabianda for this purpose. The results of the campaign are seen at a glance in the accompanying table.

The endemic index before and after quinine prophylaxis.

LOCALITY.	PARASITE INDEX.		SPLENIC INDEX.	
	Before.	After.	Before.	After.
Biguglia ..	20	0	30	16.6
Lago ..	8	0	16	3.7
Arena ..	20	0	40	20
Casabianda ..	15	0	17.24	12.5
Fort Aleria ..	15	0	50	25
Ghisonaccia ..	31.8	5.55	54.54	16.66

The authors consider it advisable that the people should be taught the essential known facts about malaria by a series of popular lectures. They advise the screening of houses, or at least one room in each house, besides the free distribution of quinine during the fever season.

P. H. B.

BYRD (Hiram). *Mosquitoes. Rôle of Certain Species in Prevention of Malaria.*—*New Orleans Med. & Surg. Jl.* 1914. July. Vol. 67. No. 1. pp. 14-17.

The author has found in Florida that the prevalence of malaria in a given locality bears an inverse ratio to the abundance of salt marsh mosquitoes. The reason for this anomaly appears to be that the inhabitants of these salt marshes screen their houses in order to protect themselves from all kinds of insects.

P. H. B.

GRUMANN & BONTEMPS. **Larvierte Form einer Malaria in malaria-freier Gegend.** [A Modified Case of Malaria occurring in a Malaria-free District.]—*Deut. Med. Wochenschr.* 1914. May 28. Vol. 40. No. 22. pp. 1113-1114. With 1 fig.

The authors record a quite unsuspected case of tertian malaria in a resident of Altona (Hamburg.) They are quite at a loss to know how the infection was acquired as they have so far failed to find any anophelines in the town. The occurrence of severe facial neuralgic symptoms during the attack imparts to the case a certain amount of clinical interest.

P. H. B.

VAN DRIEL (B. M.). **Een Geval van Spastische Spinaalparese bij Malaria tertiana.** [A Case of Spastic Paraplegia in Tertian Malaria.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1914. Vol. 54. Pt. 2. pp. 217-222.

A spastic paralysis with increased reflexes and a positive Babinski sign developed during the course of an attack of benign tertian fever. As the symptoms rapidly disappeared under vigorous quinine treatment, and as no other cause of a latent sclerosis could be discovered, the author is inclined to attribute the onset of the paralysis either to a blockage of the spinal capillaries by the malaria parasite itself or by its pigment—melanin.

P. H. B.

TRESIDDER (A. G.). **Intramuscular Injections of Quinine.**—*Lancet.* 1914. June 6. pp. 1647-1648.

In this letter Captain Tresidder replies to the remarks made by Sir Ronald Ross regarding the successful treatment of a case of malarial coma by intramuscular injections of quinine (see this *Bulletin*, Vol. 4, p. 92). He points out that Sir David SEMPLE's experiments appear to disprove the statement that quinine is absorbed with very great difficulty from muscle and subcutaneous tissue. Further he cites the results of clinical experience in favour of this method of administration and quotes MACGILCHRIST to the effect that although quinine, when given by the mouth, is more rapidly absorbed, the curve of absorption is more sustained when the intramuscular method is employed. He states that a "possible explanation of the clinical observation that injections of quinine do good when oral administration fails is that in malaria the co-existing catarrhal condition of the gastro-intestinal tract may considerably inhibit the absorption of quinine." Later on he refers to Sir David SEMPLE's experiments as regards the relation of intramuscular quinine injections to tetanus and records his belief, with which most clinicians in the tropics will certainly agree, that these experiments have never convinced him that quinine injections as used in practice are dangerous, or that their administration requires the simultaneous injection of tetanus antitoxin. He criticises the experiments, laying stress on the magnitude of the doses employed in the case of guinea-pigs, and showing that corresponding doses in the case of human beings would amount to over 100 grains for a man of 11 stone. If, he says, it is true that quinine injections favour the onset

of tetanus by paralysing the phagocytes and by destroying tissue at the site of injection, then the larger the dose of quinine the more favourable would be the conditions for the development of tetanus. In this connection he pertinently remarks that it would be interesting to know what percentage of guinea-pigs, if any, would develop tetanus after the injection of 1-15th grain of quinine, which is the proportionate dose for a guinea-pig of 500 grammes weight, assuming that 10 grains is a suitable dose for a man of 11 stone. He agrees with Sir Patrick MANSON that it is not the quinine but faulty technique which is to blame.

In his experience, cases of malaria, even in its pernicious forms, do not, as stated by Ross, generally recover temporarily without any treatment at all. The convulsions which occurred in his case he attributes to the toxins of malaria irritating the cerebral centres, and he concludes his paper by reaffirming his belief in the value of intramuscular injections.

[The question which Captain Tresidder discusses is one of such importance that the reviewer may perhaps be permitted to make some remarks regarding it. There can be no doubt that African practice and, as is evident from a trenchant article in the *China Medical Journal* for July, 1914, Chinese practice is strongly in favour of intramuscular quinine injections. The writer had recently an opportunity of discussing the question with a British physician in Maracaibo, who has had a large experience in the treatment of severe cases coming from the very malarious districts in north-western Venezuela. He pinned his faith to the injection method. Recently a sad case occurred there, for a young American engineer treated by a local native practitioner with intramuscular injections died of tetanus, the direct result of the treatment. Enquiry, however, showed that there had been gross carelessness and no attempt either at sterilisation or common cleanliness. As is well known ROSS, ROGERS, THAYER, BATES and others are opposed to the injection method, but in the case of the last named the objection is a modified one, as will be apparent if reference be made to the summary of his paper appearing in this *Bulletin*, Vol. 2, p. 554.]

There is doubtless something to be said on both sides, though personally the writer is of opinion that SEMPLE has not proved his case, and that, if proper precautions be taken, the risk of tetanus may be ignored, while if a suitable salt be employed in adequate dilution necrosis and abscess formation need not be feared. Theoretically, there is a good deal of evidence pointing to the superiority of the oral method of administration. For a time the writer was an upholder of this method, and he still thinks that in many cases where the stomach tolerates quinine, and more especially when quinine can be given in effervescent mixture, it is best to administer it by the mouth. On the other hand, his own experience, and perhaps to a greater extent that of others, has taught him the value and efficacy of intramuscular injections. They are indicated in all cases of gastric disturbance such as so often occurs in quartan infections, in all cases which, high dilution is urgently required, in cases where pernicious symptoms have developed, or where pernicious aura is present. In all such cases the writer believes in two, three or more quinine injections, and then, if it can be tolerated, ample and prolonged treatment by the mouth, giving the drug preferably in effervescent form. In two severe quartan attacks, one of which occurred in his own case, the happiest results were obtained, the cure being, so far as can be told, complete, and it must be remembered that quartan malaria is the type specially prone to relapse. In both these cases quinine failed at first when given orally, possibly on account of gastric disturbance. One is inclined to think that the personal equation is not sufficiently considered. Doubtless, muscles differ just as stomachs differ. Some can readily absorb quinine, others cannot. It is possible that the age factor has to be remembered. One has seen intramuscular injection apparently fail in a debilitated subject of nearly 50 years of age.

Again, it is likely that sufficient work has not been carried out as to the most suitable site for injection. We find that most prefer the buttock, but one German physician favours the deltoid. There is research to be done in this direction. After all, however, and with due deference to theories and to experimental work, it is to be remembered that there is a wise old Scottish proverb to the effect that "the proof of the pudding is the preening o't." There is, undoubtedly, a vast mass of clinical experience to show that intramuscular quinine injections possess the confidence of members of the profession practising in the tropics, and this is true amongst all nations and probably in every country. Captain Tresidder puts the matter in a nutshell when he says, "I think it unlikely that the practitioner in the tropics would give the care and time necessary to their preparation unless he firmly believed that some material advantage was to be gained for his patient, and unless his results from this mode of treatment were clinically more satisfactory than those obtained by the much simpler action of writing a prescription."

In this connection it is perhaps not out of place to direct attention to the treatment of lobar and lobular pneumonia by large intramuscular injections of quinine as carried out by SOLIS-COHEN in the United States. The quinine, given along with cocaine or pituitary extract and in certain cases associated with vaccine therapy, is believed to neutralise the toxins of pneumonia and to prevent cardio-vascular paralysis. It is said to be very successful and even when it fails to effect a cure it adds greatly to the patient's comfort. It certainly does not hurry him to the grave in convulsions or impose upon him weary days of suffering as a result of muscle necrosis or abscess formation*.]

A. Balfour.

GIEMSA (G.) & WERNER (H.). *Erfahrungen mit weiteren dem Chinin nahestehenden Alkaloiden und einigen ihrer Derivate bei Malaria.* (Ausführliche Mitteilung). [Further Experiences with Alkaloids closely related to Quinine and some of its Derivatives in Malaria.] *Beihefte z. Arch. f. Schiffs- u. Tropenhyg.* 1914. June. Vol. 18. Beiheft 5. pp. 81-100. [pp. 237-256.] With 25 curves.

In this paper the authors supplement the observations they have already published on the same subject, (see this *Bulletin*, Vol. 3, p. 257).

Chinidin (*Conchinin*) ($C_{19}O H_{24} N_2O Hcl + H_2O$) was given in doses of 4 grammes daily to 36 cases of tertian and subtertian malaria, and was found to be as effective as quinine itself.

Hydrochinidin ($C_{20}O H_{26} N_2O_2 Hcl$) was tried in 5 tertian and subtertian infections. The conclusion derived was that the hydrolysis of the alkaloid in no wise increased its antimalarial properties though according to MORGENROTH it increases its trypanocidal properties *in vitro*.

Cinchonin ($C_{19} H_{22} N_2O Hcl + 2H_2O$) and *Hydrochinchonin* ($C_{19} H_{24} N_2O_2 Hcl + 2H_2O$) were found to be by no means as effective as quinine and in a similar manner the rare and costly cuprein showed but feeble qualities.

Chinaethylin ($C_{22}O H_{26} N_2O_2 H_2SO_4 + H_2O$) and *Chinopropylin* ($C_{22} H_{28} N_2O_2 H_2SO_4 + 1\frac{1}{2} H_2O$) in doses of 3 to 4 grammes caused the rapid disappearance of the parasites within a few days.

Apparently the antiparasitic properties of cuprein are increased by the addition of iron hydroxyl groups and reach their maximum in the

* A paper by the author just cited on the intramuscular use of quinine in malaria is just to hand. (*American Journal of Tropical Diseases and Preventive Medicine.* 1914. August. p. 124.)

ethyl group, while in their higher homologues this property again diminishes.

The authors propose to conduct further experiments on these drugs *in vitro*, using for this purpose some easily cultivated protozoon, such as *Colpidium*.
P. H. B.

MÜHLENS (P.) & GELHAAR (F.). **Ueber Arsalytbehandlung, insbesondere bei Syphilis und Malaria.** [Arsalyt in the Treatment of Syphilis and Malaria.]—*Beihefte z. Arch. f. Schiffs- u. Tropenhyg.* 1914. June. Vol. 18. Beiheft 5. pp. 146-154. [pp. 302-310.]

Arsalyt is a convenient and necessary abbreviation for a synthetic compound known as Bismethylaminotetraaminoarsenobenzol. Although GIEMSA has estimated the *dosis tolerata* at 3.6 grammes for a man of about 70 kilogrammes body weight, yet untoward symptoms followed the intravenous injection of .1 gramme in one case.

In malaria the results of intramuscular injection (.3 gramme) were encouraging; the immediate attack was cut short, but relapses, especially in subtertian infections, were not prevented. It is clear that, as in the case of salvarsan and neosalvarsan, total extermination of the parasites is not to be expected, although these drugs can act as excellent adjuvants, and in every case their exhibition should go hand in hand with that of quinine.

Good results were obtained in tropical ulcer and in syphilis by administering the drug by the intramuscular route.
P. H. B.

FLETCHER (William). **The Wassermann Reaction in Malaria.**—*Lancet.* 1914. June 13. pp. 1677-1678.

In view of the work of de HAAN, who found that the majority of malarial sera were positive to the Wassermann reaction (see this *Bulletin*, Vol. 2, p. 557), and especially after the expressed opinion of Professor WASSERMANN himself, it was determined to investigate the subject thoroughly at Kuala Lumpur.

The sera of fifty cases of malaria (20 subtertian, 17 simple tertian and 13 quartan) were examined; in every instance parasites were present in the blood at the time of collection. All the subtertian cases gave a negative reaction save three, whose past histories as regards syphilis were doubtful. All the tertian and quartan cases were negative with the exception of two who had previously suffered from syphilis. It was considered that possibly the intensity of the infection might influence the reaction, an idea which a rough count of the parasites present in the red cells in each case did not confirm. In all the foregoing cases the serum was inactivated by being heated for 30 minutes at a temperature of 55° C., and as a number of malarial sera not treated in this manner gave a weak positive reaction, the author is inclined to think that the omission of this precaution may account for the number of positive results obtained by other observers.

The method employed by Fletcher is that of BROWNING, CRUIKSHANK and MCKENZIE, the distinguishing feature of which is the use of two antigenic extracts, one of ox-liver lecithin, the other consisting of a mixture of lecithin and cholesterin, and the employment of an anti-ox haemolytic system.

P. H. B.

LAWSON (Mary R.). **Free Malarial Parasites and the Effect of the Migration of the Parasites of Tertian Malarial Infections.**—*Jl. Experim. Med.* 1914. June. Vol. 19. No. 6. pp. 523-535. With 6 plates.

This paper, like one by the same author recently summarised (see this *Bulletin*, Vol. 4, p. 85), is illustrated by numerous coloured plates and microphotographs and adduces further evidence of the extra corpuscular habit of the tertian parasite. The author's summary of the results of this investigation is as follows :—

(1) The malarial parasite is extracellular throughout its life cycle and migrates from red corpuscle to red corpuscle destroying each before it abandons it; in the brief intervals between, the parasite is free in the blood serum; it does not remain long free, but almost immediately attaches itself to another red corpuscle by means of delicate pseudopodia.

(4) The malarial parasite can live for some time free in the blood serum, though under normal conditions there is no reason why it should remain free for any length of time, and there are certain periods in the life of the parasite when it must be admitted that it is free from the corpuscle and survives. If the parasite is, as I believe, attached to the external surface of the red corpuscle, it is constantly exposed to the action of the patients' serum.

(5) The destruction of more than one red corpuscle by each parasite would readily account for the severe and early anaemia occurring in malarial infections.

P. H. B.

MARTINI (Erich). **Ueber die Entwicklung von Malariaparasiten im Basschen Nährboden.** [On the Development of Malaria Parasites on Bass's Medium.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1914. June 13. Vol. 74. No. 3/4. pp. 250-254. With 2 coloured plates and 1 text fig.

The author has, after many unsuccessful attempts, succeeded in cultivating the asexual cycle of the subtertian parasite after Bass's method.

The paper is illustrated by some very brilliant colour-microphotographs by Professor von WASIELEWSKI.

P. H. B.

BLACKWATER FEVER.

PLEHN (Albert). *Ein Beitrag zur Kenntnis der akut hämolytischen Malaria. (Schwarzwasserfieber).* [A Contribution to the Knowledge of Acute Haemolytic Malaria (Blackwater Fever).] *Deut. Med. Wochenschr.* 1914. July 9. Vol. 40. No. 28. pp. 1414-1416.

Blackwater fever cases can be grouped according to several types which can be recognized after long experience and of which the prognosis differs considerably.

(1) Generally the haemolytic attack is ushered in by a rigor followed by high fever. The urine passed immediately after is bloodstained; in a short time a distinct icterus develops, which reaches its maximum intensity on the third day. At the end of the second, generally at the end of the third day, the fever falls to normal; the urine soon becomes normal in colour till the last traces of albumen disappear one to two days later; at this stage the patient begins to feel better. Anuria occurring at the third day is the complication which is most to be feared in this form.

(2) The cases which suffer from intermittent attacks of haemoglobinuria and rigors have a less favourable prognosis. Icterus in such cases is generally very slight and anuria a very infrequent complication. The anaemia is, however, progressive, death taking place on the fourth or fifth day.

It is a remarkable point that Plehn should have seen more cases of this kind since he has been in Berlin than he ever encountered in Kamerun, and that the death-rate from this form is considerably higher in that city than in the tropics.

The clinical history of one such case is given in detail. In the acute haemolytic stage abnormal cells, such as gigantoblasts, appear in the blood, but it is worthy of note that nucleated red cells or normoblasts are not a feature of convalescence at a stage when blood regeneration is active.

In the treatment of these cases Plehn is not in favour of the intravenous injection of physiological saline or of Ringer's solution on too liberal a scale.

(3) *The fulminating-toxic type.* The icterus is very slight, but anuria, coma and death follow within twenty-four hours. In a series of over 170 cases two of this kind have come under the author's notice.

(4) *A haemorrhagic type* with extravasations of blood from stomach and intestines is recognized, but according to the author's experience is certainly not common.

(5) *The abortive ambulant type* is one in which haemoglobin appears in the urine after a small prophylactic dose of quinine, and the true clinical picture of blackwater fever can be further complicated by the supervention of parenchymatous nephritis or obstruction of the common bile ducts; both complications however are rare.

P. H. B.

LALOR (N. P. O'Gorman). **Investigation of Malaria in the District of Katha.**—iii + 18 pp. With 2 maps, 2 coloured plates and a chart. 1913. Sept. Rangoon: Office of the Superintendent, Government Printing, Burma.

Blackwater Fever. In the course of a systematic blood examination of Burmese children, Lalor encountered in the nucleus of the mononuclear cells certain accretions of chromatic material; these he considers are parasitic in nature, though his reasons for doing so appear hardly adequate.

The spores losing their envelopes enter, or are taken up by the mononuclear cells and develop into rosettes. The cytoplasm of the spore is blue with bluish stippling and contains a round mass of chromatin and a vacuole. Associated with them are malarial plasmodia of great malignancy.

Lalor wishes to connect his newly discovered bodies with the presence of blackwater fever, which is endemic in that part of Burma. A poorly-executed coloured plate accompanies the report and purports to portray these bodies and their associated malaria parasites as they appear in a blood film. (See also this *Bulletin* Vol. 2, p. 317.)

P. H. B.

DAVID. **Sur l'Étiologie et la Prophylaxie de la Fièvre bilieuse hémoglobino-urique.**—*Bull. Soc. Path. Exot.* 1914. June. Vol. 7. No. 6. pp. 509-512.

The author, who has practised for several years in a country where blackwater fever is common (Palestine), considers that three conditions are necessary before an attack can develop.

(1) The patient must be an old malarial subject; (2) He must have been treated with considerable doses of quinine; (3) He must have omitted to take his habitual dose of quinine some time before the dose which determined the attack of blackwater fever.

As to the exact nature by which quinine determines the onset of haemoglobinuria the author is uncertain, but he thinks it is possibly an anaphylactic effect.

P. H. B.

YOFÉ (Hillel). **A propos de la Fièvre hémoglobino-urique en Palestine.**—*Bull. Soc. Path. Exot.* 1914. June. Vol. 7. No. 6. pp. 512-514.

As one who has practised for 23 years in very malarious districts in Palestine, the author is able to confirm two of the hypotheses put by DAVID in the paper reviewed above; the third hypothesis—namely that haemoglobinuria develops in those who have not taken quinine for some time previously to the dose which determines the attack—he is quite unable to confirm, since he can quote a number of cases in whom haemoglobinuria developed while they were undergoing regular treatment with small doses of quinine. He concludes that a quinine prophylaxis in small daily doses (·25-·4 grammes) during the fever season is the best means of warding off an attack of haemoglobinuria.

P. H. B.

BOOK REVIEW.

LAMBART (H. C.). [M.A., M.D., L.R.C.P. & S. Edin., L.R.F.P. & S. Glas., &c.] **A Practical Handbook of the Tropical Diseases of Asia and Africa.**—xv + 324 pp. With 6 coloured plates and 82 other illustrations. 1914. London: Charles Griffin & Co. [Price 8s. 6d. net.]

According to the author's statement in the Preface his book embodies the experience gained by residence in various parts of the tropics, and aims at being a concise and practical manual. By arranging the subjects alphabetically he hopes to show, at a glance, the diagnosis and treatment of the principal tropical diseases. All theories are avoided and the work, stripped to essentials, is arranged for readiest reference. Special attention has been paid to treatment and sections are specially devoted to aids to diagnosis, bacteriological methods, special diet, eye diseases, geographical distribution, fevers, and skin diseases.

There are so many good works on tropical medicine that a high standard of accuracy is naturally demanded of a new one. Unfortunately we do not find it in Dr. Lambart's book. Its pages show evidence of haste in compilation and there are many inaccurate statements which render it not only misleading to the layman but most unsuitable for the student and beginner in tropical medicine. For instance, talking of the morbid anatomy of sleeping sickness on page 9, the author states "The brain substance, sometimes firm, at others soft and oedematous, usually congested, with fluid in the ventricles, is increased." What does this mean? Again on page 167, in the part on filariasis under the heading urine, it is stated "Albumin always present sugar absent. Generally of milky appearance, or pinkish from blood admixture." This of course applies to the urine in chyluria, but this is not stated in the text, and might easily give the impression that it was the normal condition of the urine in filariasis. Further the statement on the same page "the worms are whitish in colour, long and filiform, with a globular head terminating in a circular unarmed, lipless mouth; the tail is rounded (fig. 38)" refers clearly to the adult worms, though the figure represents an embryo. On page 171 "the genus *Stegomyia* *culex*" is spoken of, on page 219 *Culex* *stegomyia*. *Amoeba coli* (page 216) is said to be "easily found in the sloughs on the ulcerated surface and also in the mucus thrown off by the inflamed bowel and liver abscess" though a fairly correct account of the entamoebae is given on pages 220 and 240. Kala azar is defined as "a chronic specific febrile disease caused by *Leishmania donovani*, a parasite introduced into the human body by the bite of a *Conorhinus*" (page 143). We are not aware that proof of transmission has been brought in the case of any bug; that suspected is *Cimex*, as is stated on page 67. Misspellings are frequent.

We have drawn attention to these errors—and others might have been cited—because, whatever good points the work possesses, such inaccuracies are inadmissible in a "practical hand-book" of tropical diseases, and obviously make it unfit for general use. The book needs thorough revision before it can be recommended.

EDITORS.

ERRATA.

Vol. 4. p. 153, pagination of Agramonte's paper should be 77-81.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES
BULLETIN.

Vol. 4.]

1914.

[No. 6.]

AMOEBIASIS AND DYSENTERY.

AMOEBIASIS.

WILLETS (David G.). **Intestinal Parasitism, particularly Entamoebiasis, in Patients of the Philippine General Hospital, Manila, P. I.**
—*Philippine Jl. of Science*. Sect. B. Trop. Med. 1914. Feb.
Vol. 9. No. 1. pp. 81-92.

This investigation, entailing a great deal of systematic work, was undertaken in order to supplement and extend the observations of WALKER on the same subject [see this *Bulletin*, Vol. 3, p. 63]. Special attention was directed to determine (1) the frequency of infection with entamoebae in patients entering the Philippine General Hospital, and (2) the relative percentage of infection with *E. coli* and *E. histolytica*; simultaneously statistics on the helminthic infection were also compiled. The stools were collected, after a preliminary saline aperient, from all inside hospital patients admitted during 1913, and two thin coverslip preparations of one specimen from each case were examined.

No stains were used, and three stages of entamoebae were recognised—the encysted, the active and the quiescent. The experience of the last few years has led the author to believe that, if several stool specimens of each case were systematically examined, the percentage of entamoebic infection would be found to be even higher than that recorded below. The figures obtained by various American investigators on the same subject during recent years vary greatly; this is easily explicable, since they have not worked under precisely the same conditions. The author has been at great pains to distinguish between *E. coli* and *E. histolytica* in the vegetative stage, and concludes that only in the cysts can a differential diagnosis be made with certainty. In the vast majority of cases presenting a double infection *E. coli* cysts greatly outnumbered *E. histolytica*. In dysenteric stools the amoebae conformed almost exclusively to the description of active *E. histolytica*; in other words the infections were apparently pure. The frequent association of *E. coli* and *E. histolytica* cysts in normal stools raises in the author's mind once more the debatable point as to whether they are not morphological homologues of the same species. It is possible, he thinks, that the *E. coli* may become active and alter

its morphological appearances in a dysenteric stool. The positive results of the work can be summarised as follows:—

Entamoebae were found in 37.5 per cent. of the 1,000 individuals examined, in 38.8 per cent. of 900 Filipinos, in 26.0 per cent. of 100 Americans, in 46.3 per cent. of 417 adult female Filipinos, in 34.2 per cent. of 383 adult male Filipinos, in 25.0 per cent. of 100 Filipino children, and in 27.6 per cent. of 29 adult female Americans. Double infections were present in 59.2 per cent., pure *E. coli* infections in 35.5 per cent., pure *E. histolytica* infections in 5.3 per cent.

The encysted form is the only stage of development in which a differential diagnosis between *E. coli* and *histolytica* can be made with certainty.

P. H. BAHR.

KUENEN (W. A.). **De Entamoeben van den Mensch en de Amoeben-Dysenterie.** [The Entamoebae of Man and Amoebic Dysentery.]—*Geneesk. Tijdschr. v. Nederl. Indië*. 1914. Vol. 54. No. 3. pp. 235-318. With 6 plates.

This is a descriptive account of the amoebae found in the alimentary canal of man, both pathological and other, for the benefit of Dutch readers. The latest researches on the subject are duly summarised and some good directions are given for the staining of the organisms. The clinical side of the subject is only lightly touched on. From the figures given by the author amoebic dysentery would seem to be an important cause of illness amongst the coolies employed on the plantations in Sumatra, the Chinese coolies being by far the chief sufferers. The six plates contain a large number of drawings of amoebae by the author of a very high degree of excellence.

J. B. Nias.

IZAR (G.). **Studien über Amöbenenteritis.** [Studies on Amoebic Dysentery.]—*Beihefte z. Arch. f. Schiffs- u. Tropenhyg.* 1914 Feb. Vol. 18. Beiheft 2. pp. 5-39. [pp. 45-79.] With 1 plate.

Four articles on amoebic dysentery presenting nothing very novel to English readers versed in tropical diseases. The author is an Italian medical man, though he writes in German, and has drawn his material from the cases of Italian soldiers invalided from Tripoli. The first paper gives a clinical account of three cases of dysentery, of which one was fatal. The second describes the post mortem findings in a case of liver abscess. The third records some experiments with amoebae on cats, and the fourth contains brief observations on antibodies.

S. R. Douglas.

CHRISTIE (W. Ledingham). **Latent Dysentery, or Dysentery Carriers in Sarawak, Borneo.**—*Brit. Med. J.* 1914. July 18. p. 118.

The author thinks it probable that most of the debility, anaemia and fever ascribed to malaria in Borneo is due to the septic and irritated condition of the colon in patients infested with amoebae, who show no signs of blood or mucus in their stools till an advanced stage of ulceration has been reached. He concludes that 30 to 40 per cent. of the native population are dysentery carriers, that an early examination and treatment with salines clears the colon of amoebae and thereby prevents dysentery, and that much invaliding and debility are due to latent dysentery.

P. H. B.

- LIM BOON KENG. i. **A Brief Note on Amoebic Dermatitis.**—*Jl. Trop. Med. & Hyg.* 1914. July 1. Vol. 17. No. 13. pp. 193-194.
- ii. **Preliminary Notes on Entamoebiasis.**—*Ibid.* Aug. 1. No. 15. p. 227.
- iii. **Further Notes on Entamoebiasis.**—*Ibid.* Aug. 15. No. 16. pp. 244-246.

i. A form of cutaneous ulceration is described to which the Chinese at Singapore are particularly liable, and which the author infers is amoebic in origin and therefore curable by emetine injections.

ii. In the second paper the author wishes to ascribe to an amoeba the rôle of the pathogenic agent for a variety of conditions, including urticaria, bullous eruptions and ulcers, chronic bronchitis, peritonitis, and typhlitis (?).

iii. The third paper contains a description of the life cycle of this hypothetic organism, which is suggestive of a protozoon-fungus hybrid.

[It is difficult to understand what object is attained by the publication of papers such as these; they teem with dogmatic statements unsupported by experimental evidence, and are quite unsuitable for publication in a scientific journal.]

P. H. B.

- WILLETS (David G.). **Preliminary Report on the Treatment of Entamoebiasis with Ipecac, Emetine, and Neosalvarsan at the Philippine General Hospital, Manila, P. I.**—*Philippine Jl. of Science.* Sect. B. Trop. Med. 1914. Feb. Vol. 9. No. 1. pp. 93-117.

The parasitotropic properties of some preparations now in use in entamoebiasis—ipecacuanha, emetine, salvarsan, neosalvarsan and bismuth—were tested in a scientific manner. The series consisted of 132 cases, of which 27 were dysenteric and 105 non-dysenteric. Under the former category the author has classed all those harbouring the cysts of *Entamoeba histolytica* in their stools. The incubation period of amoebic dysentery having been shown by WALKER in his series of experimental cases to average 64·8 days, Willett therefore thinks that, by the discovery of the appropriate drug capable of destroying entamoebae in the cystic stage, it will be possible to prevent development of dysenteric symptoms in persons harbouring the cysts of the pathogenic amoebae.

From the fact that entamoebae are very unequally distributed in a given stool and in different stools passed by the same individual, it becomes a matter of great difficulty to estimate the intensity of an infection or to tell whether a specimen is truly negative.

In the treatment of dysenteric cases emetine was found more efficacious in causing the disappearance of symptoms than was ipecacuanha, though from the standpoint of expelling the entamoebae from the intestinal canal the two drugs were about equally efficacious. Of the emetine cases 91·9 per cent. recovered in an average of 3·6 days after the average administration of 0·287 grammes of emetine. In the corresponding ipecacuanha cases the figures were 62·5 per cent., 8·5 days and 16·3 grammes respectively.

In non-dysenteric cases, that is in those presenting no symptoms whatever, ipecacuanha was the more efficacious drug (70·8 per cent. as compared with 36·8 per cent.) in exterminating the entamoebae. Neosalvarsan (given presumably by the intravenous route) was efficacious in 100 per cent. of cases, though it is to be noted that the number so treated was small—*i.e.* eight.

From the foregoing it appears that ipecacuanha is a superior drug to emetine in its power of expelling entamoebae from the intestinal tract. The explanation of this may lie in the fact that the dosage of emetine varied widely and also that the drug was administered in some cases hypodermically, in others intravenously.

The author concludes that, in spite of his work, the relative value of ipecacuanha, emetine, and salvarsan in dysenteric as well as in non-dysenteric amoebiasis requires much further observation.

P. H. B.

DUMAS (R.). **Malades traités par l'Émetine à Saïgon et au Cap Saint-Jacques pendant l'Année 1913. Dysenteries Amibiennes ou Mixtes.**—*Bull. Soc. Path. Exot.* 1914. May. Vol. 7. No. 5. pp. 405-406.

A table is given showing the results of the treatment of a series of cases of dysentery with emetine at Saïgon and Cap Saint-Jacques during the year 1913. At Saïgon 187 cases of dysentery, 70 of diarrhoea and 42 of acute congestion of the liver were treated, while at Cap Saint-Jacques the number was not quite so large, 51 being dealt with.

The author's conclusions in brief are that emetine has a rapid action on amoebic dysentery, but none on pure bacillary dysentery. He advises the application of the drug during convalescence, in hepatic congestion, and after operations for abscess of the liver.

G. C. Low.

SIEBERT (H.). **Ueber die Behandlung der Amöbenruhr mit Emetin.** [The treatment of Amoebic Dysentery by Emetine.]—*Arch. f. Schiffs- u. Trop. Hyg.* 1914. July. Vol. 18. No. 13. pp. 439-453.

Siebert considers that in his practice [plantation hospital, Java] there is only one objection to emetine, and that is the question of expense. On an average each case under treatment stays six days in hospital, and if vigorously treated absorbs 6·24 marks worth of emetine. On ipecacuanha the average stay in hospital would be about ten days and the cost of the drug 36pf. The former treatment is therefore 17 times more expensive [in drugs] than the latter.

He considers that there is still scope for the employment of ipecacuanha as an anti-dysenteric and that emetine is indicated (1) in acute amoebic dysentery; (2) in slight cases unable to take ipecacuanha; (3) in cases which do not react to ipecacuanha; (4) in cases which cannot be properly nursed.

P. H. B.

DEEKS (W. E.). **Emetine in Amoebic Dysentery.**—*Ann. Trop. Med. & Parasit.* 1914. July 22. Vol. 8. No. 2. pp. 353-355.

Deeks has had brilliant results in his treatment of amoebic dysentery and liver abscess by emetine (6 cases); his method of administration does not differ from that employed by other authorities. He believes the drug is a direct poison to the amoebae as quinine is to the malarial parasite. In the majority of cases he considers three grains to be sufficient, but in more severe ones six to eight are necessary to produce a cure. Should diarrhoea persist, bismuth in large doses is advantageous.

P. H. B.

HOSTALTRICH. **Note sur l'Emploi du Chlorhydrate d'Éméline en Injections Endoveineuses.**—*Bull. Soc. Med. Chirurg. de l'Indochine.* 1914. May. Vol. 5. No. 5. pp. 164-165.

A short account of the successful treatment of a case of amoebic dysentery with intravenous injections of .05 cgm. (.077 gr.) of emetine hydrochloride. The author thinks the intravenous method is indicated in very acute cases.

[The almost microscopic dosage of emetine employed is remarkable.]

P. H. B.

FLANDIN (Charles). **La Recto-Colite Sèche d'Origine Amibienne; son Traitement par le Chlorhydrate d'Éméline.**—*Bulls. et Méms. Soc. Méd. des Hôpît. de Paris.* 1914. July 16. 3e Sér. Vol. 30. No. 25. pp. 104-111.

Chronic constipation is a common sequel to an acute attack of amoebic dysentery; this condition the author terms "dry rectocolitis." On sigmoidoscopic examination the mucous membrane is red, dry and ulcerated, and sometimes covered by a false membrane. A series of eight cases illustrates the author's arguments; it need hardly be added that every one of them made a rapid and complete recovery after numerous emetine injections. The author considers that every case of amoebic dysentery should be examined by the sigmoidoscope.

P. H. B.

ARCHIBALD (R. G.). **Emetine Treatment of Dysentery in Young Children.**—*Jl. Trop. Med. & Hyg.* 1914. June 1. Vol. 17. No. 11. pp. 161-163.

After having referred to the numerous papers which have been lately published on the therapeutic value of emetine in amoebic dysentery affecting adults, the author records the use of the drug in the treatment of this disease in children in the Sudan. One of these cases was a severe infection and the effects of the drug were delayed, living amoebae being present in the patient's stools even after a total of one and a half grains of emetine had been administered. The author finally arrives at the following conclusions:—

"1. Young children are extremely tolerant of the drug emetine. In severe cases of entamoebic dysentery it is advisable to commence with an initial dose of $\frac{1}{2}$ gr. for a child of two, and repeat this dose every twelve hours, till a total of $\frac{1}{2}$ gr. has been given.

"2. The total amount of emetine administered should be controlled by the evidence obtained by microscopical examination of the stools, a procedure which should also be carried out at intervals during convalescence.

"3. In order to avert relapses, the continued treatment by emetine after the patient's apparent recovery from dysentery would be advisable.

"4. In entamoebic dysentery of the Sudan emetine may require to be given in larger doses than are usually employed in other countries."

G. C. L.

BARLOW (Nathan). **The Administration of Emetine to Young and Debilitated Children.**—*Amer. Jl. Trop. Diseases & Prevent. Med.* 1914. June. Vol. 1. No. 12. pp. 864-865.

A white child of 16 months after recovery from an attack of malignant malaria still remained greatly debilitated. Examination of the faeces revealed great numbers of *E. histolytica* and consequently one-seventh of a grain of emetine was injected daily for two weeks. Great improvement and gain in weight were noted.

[The age of the patient is the main point of interest in this case. As a general rule infants are more liable to bacillary than to amoebic infection.]

P. H. B.

LORCIN. i. **Traitement d'un Cas d'Absès du Foie par le Chlorhydrate d'Emétine.**—*Rev. Méd. et d'Hyg. Trop.* 1914. Vol. 11. No. 1. pp. 15-17.

ii. **Traitement de Dix-huit Cas de Dysenterie par le Chlorhydrate d'Emétine.**—*Ibid.* pp. 25-26.

i. Amoebic abscesses of the liver, the author states, get well of themselves more often than is supposed. In four years he has seen ten cases of the kind. They are small abscesses on the convex aspect of the liver, without much objective or subjective reaction. Relapse, to which they are subject, took place in four of the ten. Evidently, the author writes, the cure of these abscesses by emetine would not be a test of the efficaciousness of the treatment since spontaneous cure is the rule. These reflections, however, do not apply to large abscesses. He gives details of a case which certainly would have been fatal without the use of emetine. He was unable to procure this product [apparently he was in Madagascar], but succeeded in extracting the alkaloids from ipecacuanha.

ii. In two months the author has treated 18 cases of dysentery by emetine extracted as above from ipecacuanha. Sixteen were certainly of amoebic origin. The results in all cases were good. The advantage of emetine is not only a shortening of the duration of treatment, but that it permits a less strict diet, which is of importance when one has to deal with natives. It is not known if any of these cases relapsed.

A. G. B.

LE PAPE. **L'Emétine dans les Amibiases à Harrar (Abyssinie).** [Clinique d'Outre-Mer].—*Ann. d'Hyg. et Méd. Colon.* 1914. Apr.-May-June. Vol. 17. No. 2. pp. 547-551.

The author has had excellent results from injection of emetin hydrochloride in two cases of liver abscess subsequent to the evacuation of

the pus. The dysenteric motions contained in one case numerous balantidia as well as amoebae. From the rapid disappearance of the former after the full effect of the drug had taken place the author concludes that it has the same specific action on these protozoa as on the *Entamoeba histolytica*. P. H. B.

NIXON (P. I.). Chaparro Amargosa in the Treatment of Amebic Dysentery.—*Jl. Amer. Med. Assoc.* 1914. May 16. Vol. 62. No. 20. pp. 1530-1533.

This remedy, which the author has used in ten cases, he believes to be "the most efficient we have at present for treating amoebic dysentery unless we except emetine." Chaparro amargossa (bitter bush) has been a domestic remedy among the Mexicans of south-west Texas and Mexico for many years. Botanically it is *Castela nicholsoni*, Hook., and belongs to the Simarubaceae; one authority places it in the natural order Ochnaceae. It is a small thorny shrub found on low rocky hills. It is on the market as a fluid extract, the dose being one to three fluid drachms before meals. The author keeps the patient in bed on restricted diet and gives an ounce of magnesium sulphate three or four hours before the treatment and repeats it every two or three days. Six or eight ounces of an infusion of Chaparro are given by mouth half an hour before each meal and at bedtime; rectal enemata are also given. The author details some experimental observations to show the amoebicidal action *in vitro*. Details are given of the ten cases; *Entamoeba histolytica* is stated to have been present in each. The cases were of three weeks to four years' standing. There has been no recurrence, the period of freedom ranging from ten months to two years.

[It must be remembered that rest in bed on restricted diet and treatment by sulphates are themselves curative.]

A. G. B.

HEYMANN (P.). Du Traitement des Dysenteries Chroniques Ambiennes par l'Air Chaud.—*Bull. Soc. Méd. Chirurg. de l'Indochine.* 1914. May. Vol. 5. No. 5. pp. 170-181. With 2 figs.

Seeing that emetine has no action on amoebic cysts, it was considered advisable to try the action of hot air upon dysenterics, especially in the chronic stage. It was applied to the skin of the abdomen.

The therapeutic action was not very encouraging; pain was relieved, but no marked diminution was noted either in the number of vegetative amoebae or in their cysts; one case even developed a large hepatic abscess.

P. H. B.

VIVIE. Hépatite Suppurée. Absès Multiples. Mort par Ouverture d'un Absès du Lobe Droit dans l'Arrière-Cavité des Epiploons.—*Bull. Soc. Méd. Chirurg. de l'Indochine.* 1914. June. Vol. 5. No. 6. pp. 212-215.

As indicated by its title, this is an account of a case of liver abscess which, erupting into the lesser sac of the peritoneum, led to the death of the patient. At the post mortem an enlarged liver was found literally burrowed with abscesses of all sizes.

In the terminal stages the patient exhibited the following signs which suggested inflammation of the lesser peritoneal sac :—Distension of the epigastrium limited below by a horizontal line passing through the umbilicus, a dull pain intensified by pressure traversing the epigastrium in a horizontal direction from the centre of the right costal margin to the centre of the left, and oedema of the superficial tissues in this region.

In the discussion which followed the reading of this paper GAUDUCHEAU relates how he was able to produce dysenteric symptoms in a dog by intravenous inoculation of 5 cc. of pus from this case, even though he was unable at the time to find any amoebae in it by microscopical examination.

P. H. B.

DEGORCE (A.). **Dilacération du Parenchyme Hépatique dans un Cas d'Hépatite à Tendance Suppurative mais n'ayant constitué qu'un très Petit Foyer de Pus Collecté.**—*Bull. Soc. Méd. Chirurg. de l'Indochine*. 1914. June. Vol. 5. No. 6. pp. 218-222.

This paper records the case of a resident of Tonquin who had undergone an operation for hepatic abscess in October 1911. During the early part of January 1912, fever reappeared with hepatic symptoms; an exploratory operation was performed and the liver incised in many directions, a small focus of suppuration being discovered. The result was that the patient made an uninterrupted recovery. The author thinks that, should such another case present itself, he would have recourse to exploratory punctures as being a safer procedure and one likely to be followed by the same beneficial results.

[The method of treating presuppurative amoebic hepatitis by multiple punctures is now a well-recognised one; the exact effect of this procedure on the *Entamoeba histolytica* is uncertain.]

P. H. B.

BRAU. **Chlorhydrate d'Éméline et Formule Leucocytaire.**—*Bull. Soc. Méd. Chirurg. de l'Indochine*. 1914. Mar. Vol. 5. No. 3. pp. 87-90.

The report of a case of liver abscess following amoebic dysentery, in which the administration of emetine caused a marked amelioration of the symptoms, but the liver remained enlarged and leucocytic counts showed increased polynuclear cells and diminished eosinophiles.

This condition continuing, the liver region was explored by aspiration and a large abscess was located and opened. About a fortnight later a second abscess burst into the lung and the patient made a good recovery.

Several leucocyte counts are given.

S. R. D.

BONNEFAY & MAILLE. **Abcès du Foie Amibien avec Association de Bacilles de Koch.**—*Bull. Soc. Path. Exot.* 1914. June. Vol. 7. No. 6. pp. 475-479.

The pus of an hepatic abscess is generally sterile. Should a micro-organism be present it is generally the staphylococcus. The authors therefore consider this case, in which an acid fast bacillus—presumably the tubercle bacillus (as found by an inoculation experiment)—was present in the exudate as worthy of record.

The patient made a fairly good recovery after operation and emetine treatment. Suspicious signs were discovered at the apex of the right lung, but a radioscopic examination showed no tubercular lesions anywhere.

P. H. B.

SIMONIN (J.). Abscès Multiples et Indépendants du Foie et du Poumon Droit, consécutifs à une Dysenterie Amibienne, contractée au Maroc.—*Bulls. et Méms. Soc. Méd. des Hôpit. de Paris.* 1914. June 25. 3 sér. 30 Ann. No. 22. pp. 1175-1186. With 3 charts and 3 figs.

The patient, a soldier, suffered from dysentery in 1911 while on the March to Fez, but hepatic symptoms remained latent and unsuspected for a long time. Repeated aspirations proved negative. The spleen was enlarged, there was a definite haemoglobinuria towards the end and sanguinopurulent expectoration. At the necropsy three abscesses were found in the liver and two in the right lung, one of which had burst into the right bronchus, quite independent of the hepatic sup-puration. At the post mortem the large intestine was greatly infiltrated and ulcerated. Death was apparently due to thrombosis of the pulmonary artery. No lesions were found in the kidneys to account for the haemoglobinuria. A few amoebae were found in the pulmonary but not in the liver pus.

The author thinks that malaria played little part in the pathogenesis of this case as malaria parasites were never found in the blood.

[The amoebic origin of the illness does not appear to have been recognised in life and there is therefore no record of treatment with ipecacuanha; it is necessary to add that the case occurred in 1911, that is, before the introduction of emetine.]

P. H. B.

DUCKWORTH (Dyce). The Diagnosis and Treatment of Tropical Hepatic Abscess.—*Practitioner.* 1914. July. Vol. 23. No. 1. [No. 553]. pp. 1-6.

The diagnosis of tropical abscess as occurring in this country is only liable to be confused with suppurative pylophlebitis and pyaemic abscess; the latter are generally small and multiple, while the former is of a large size and is commonly a single lesion.

It is interesting and instructive to note that to Sir Dyce Duckworth's knowledge emetine was employed with success—by a Mr. William ECCLES, a senior surgeon to the Great Indian Peninsular Railway in Bombay—in 1869 in the treatment of acute dysentery.

[It would be instructive to know on what grounds bacillary dysentery is included as a cause of hepatic abscess. Suppuration occurring in the course of a dysentery of bacillary origin is probably the result of some secondary infection.]

P. H. B.

NORONHA (A. J.). **Hepato-Pulmonary Abscess treated by Emetine.**—*Brit. Med. J.* 1914. May 23. p. 1122.

In the case described in this note there was history of cough and bloody expectoration of three years' duration. An injection of one grain of emetine was given daily. Three weeks later the patient was quite well.

A. G. B.

CRAIG (Charles F.). **The Classification of Amebas with Observations on Morphology and Life Cycle of *Entamoeba coli*, *Craigia hominis* and *Vahlkampfia lobospinosa*.**—*Arch. of Internal. Med.* 1914. May 15. Vol. 13. No. 5. pp. 737-769. With 2 plates and 2 text figs.

The author in the present paper adopts CALKINS' classification of the Amoebae (see this *Bulletin*, Vol. 3, p. 74), and adds "the latest observations on *E. coli*, *Craigia hominis* and *Vahlkampfia lobospinosa*." It is admitted that the old genus *Amoeba* should be split into several genera, and that some of the free-living forms may reach the intestinal canal of man *via* contaminated food. It is believed that some of these free-living forms may become temporary parasites in man. The amoebae cultivated from faeces are considered to belong to free-living forms acquired with food or by air contamination.

With regard to the genus *Vahlkampfia*, most members are free living but some may become parasitic under certain conditions. "It is probable that nearly all species of *Vahlkampfia* may be cultivated on artificial mediums, and it is this fact that has given rise to so much confusion regarding the cultivation of the true parasitic amoebas." These organisms frequently contaminate material derived from patients suffering from entamoebic dysentery. Such *Vahlkampfia* have been cultivated in impure culture, but it is considered that "the claims . . . that the amebas so cultivated are identical with true entamebas are unsupported by any adequate evidence."

Vahlkampfia lobospinosa is a true free-living amoeba. When grown in pure culture it undergoes marked morphological and cyclical changes as shown by CALKINS and WILLIAMS [see this *Bulletin*, Vol. 3, p. 79], but in human faeces it has the morphology of a true *Vahlkampfia*. If *Vahlkampfia* live parasitic in the human intestine, it is an abnormal mode of existence and no symptoms of disease are produced. The cysts of *Vahlkampfia* resist drying better than those of *Entamoeba*. A list of species of *Vahlkampfia* is given.

Craigia hominis (*Paramoeba hominis*) was observed by Craig in 12 patients suffering from chronic diarrhoea. It contains a nucleus, an accessory nuclear body and has an amoeboid and flagellate stage of development. Multiplication is by simple division and by the formation of cysts containing minute flagellated organisms.

Trimastigamoeba philippinensis has three equal flagella when flagellated. Its nucleus is of the *limax* type and it has a contractile vacuole. It may contaminate faecal or other material from human sources, but there is no evidence that it occurs as a parasite in man or animals. It can be cultivated.

The genus *Entamoeba* is discussed and a list of species given. Many of the forms reported from man are probably not valid species; *E. minuta* and *E. tetragena*, being parts of the life cycle of *E. histolytica*, must disappear as species names; *E. nipponica*, *E. tropicalis* and *E. williamsi* are identical with *E. coli*, and so also are eliminated.

The second part of the paper is concerned with details of *E. coli*, *Craigia hominis* and *Vahlkampfia lobospinosa*.

With regard to *E. coli*, the chief new points deal with the occurrence of degenerating *E. coli* during the vegetative stage. In such organisms the nucleus may be invisible or distorted and the cytoplasm contain chromidia, as in *E. histolytica*. Enucleate entamoebae and free nuclei are also encountered. Cysts with eight nuclei are common, but as many as 16 nuclei may be present. Sometimes degenerating cysts contain compact masses of chromatin resembling the chromidial masses so characteristic of the cysts of *E. histolytica*. The nucleus of *E. coli* is said to be larger than that of *E. histolytica*, and its cyst wall is thicker.

Craigia hominis varies in morphology in its different stages. Craig has been able to "study each stage of development, including encystment, the formation of the swarmers, the process of longitudinal division of the flagellates and the development of the amebic from the flagellate stage." The "swarmers" possess a single flagellum. A full account is given of each stage. There is no evidence that *Craigia hominis* is pathogenic, except that it was found in patients suffering from chronic diarrhoea and that treatment causing its disappearance also resulted in a cure.

Vahlkampfia lobospinosa is described and a summary of recent work on *Vahlkampfia* is given. Craig states that "no amount of evidence based on mere changes in morphology or life-cycle produced by growing free-living amebas on unnatural culture material can be considered as of the slightest value in connecting them with the true entamebas, but that at most these variations simply indicate the path by which the present species of entamebas reached their parasitic mode of existence."

According to Craig, *Vahlkampfia lobospinosa* is the organism cultivated originally from human faeces by MUSGRAVE and grown by WILLIAMS and CALKINS on brain-tissue medium. [See this *Bulletin*, Vol. 3, p. 79.]

[The paper deals with *Entamoeba coli*, *Craigia hominis* and *Vahlkampfia lobospinosa* very exhaustively and the original should be consulted by all interested in amoebic dysentery. The morphology of each organism is illustrated by photographs.]

H. B. Fantham.

CRAIG (Charles F.). **The Differential Diagnosis of the Intestinal Entamebas of Man.**—*Archives of Internal Medicine*. 1914. June 15. Vol. 13. No. 6. pp. 917-944. With 16 figs.

This paper contains a useful differential diagnosis of *Entamoeba histolytica* and *E. coli*. The author lays stress on the value of observation of the living organisms, using stained preparations for confirmatory purposes. For permanent preparations he recommends

fixation by Schaudinn's fluid (corrosive sublimate alcohol) and staining by Mallory's ferric chloride haematoxylin. A summary of the important points in the differentiation of *E. histolytica* and *E. coli* is given :—

Vegetative Stage of Development : Living Preparations.

<i>E. histolytica.</i>	<i>E. coli.</i>
Actively motile.	Sluggishly motile.
Ectoplasm glass-like. Clearly differentiated from endoplasm.	Ectoplasm poorly differentiated from endoplasm. Not glass-like in appearance.
Nucleus often indistinct or invisible.	Nucleus visible and distinct.
Erythrocytes present in endoplasm when stools contain blood. Very characteristic.	Erythrocytes absent from endoplasm when stools contain blood.

Vegetative Stage of Development : Stained Preparations.

Delicate nuclear membrane and minute karyosome, when <i>histolytica</i> type of nucleus is present.	Thick nuclear membrane and large compact karyosome.
Well-defined karyosome surrounded by an unstained area and containing a centriole, when the <i>tetragena</i> type of nucleus is present.	Centriole generally invisible or indistinct.
Smaller granules and clumps of chromatin on inner side of nuclear membrane.	Large granules and clumps of chromatin on inner side of nuclear membrane.
Cyclical changes very marked in the nucleus when the <i>tetragena</i> type is present.	Cyclical changes less marked in nucleus.
Erythrocytes present in endoplasm when stools contain blood.	Erythrocytes absent from endoplasm when stools contain blood.

Precystic Stage of Development : Living and Stained Preparations.

In both the living condition and in stained preparations the differentiation of *E. histolytica* and *E. coli* is most difficult in this stage of development, and often impossible. The diagnosis should rest on the character of the vegetative or cystic forms that are almost invariably present together with the precystic forms.

Cystic Stage of Development : Living and Stained Preparations.

<i>E. histolytica.</i>	<i>E. coli.</i>
Cyst smaller.	Cyst larger.
Cyst wall thin. Double outline less frequently observed.	Cyst wall thick. Double outline frequently observed.
Cyst contains characteristic chromidial bodies.	Cyst does not contain chromidial bodies.
Cyst contains from one to four nuclei ; never over four.	Cyst contains from one to sixteen nuclei, the normal number being eight when the cyst is fully developed.

In conclusion, the author states that, in his opinion, "stained cysts are more readily differentiated than the living cysts, and in the search for 'carriers' of these bodies better results will be obtained if stained preparations are made, as well as living preparations."

H. B. F.

JAMES (William M.). **A Study of the Entamoebae of Man in the Panama Canal Zone.**—*Ann. Trop. Med. & Parasit.* 1914. July 22. Vol. 8. No. 2. pp. 133-320. With 6 plates and 5 text figs.

This well-illustrated memoir of nearly 200 pages is really a monograph on the entamoebae of man, as seen in the Panama Canal Zone. The author reviews the more important literature and deals with the life-cycles of *Entamoeba histolytica* and *E. coli* in detail. There is also a section devoted to a description of the best methods of technique (fixation and staining) for studying entamoebae. Lastly there is a bibliography.

It is quite impossible in the limited space at disposal to summarise this monograph in full. Many of the points discussed have been reviewed separately in previous volumes of this *Bulletin*. In addition we may note that "three types of pathogenic entamoebae have been found associated with acute dysentery in the Canal Zone. That most commonly found corresponds in all details to the organism described by SCHAUDINN and by CRAIG as the vegetative stage of *Entamoeba histolytica*. . . . Much less common in acute dysentery is the organism described by HARTMANN as the vegetative stage of *Entamoeba tetragena*. . . . Three times I have encountered an organism which, in fresh preparations, is identical with" the first type, but which, "when wet fixed and stained, shows characteristics intermediate between" the first and second types.

E. tropicalis (Lesage) and *E. williamsi*, *E. poleki*, *E. hartmanni* and *E. bütschlii* (v. Prowazek) are considered to be apparently "various phases in the life-cycle of *E. coli*."

The author wisely remarks that "it is not possible at times dogmatically to say, with respect to nuclear morphology in the vegetative stage, that a certain entamoeba must belong to a certain species." He is doubtful about schizogony stages. In some preparations enucleate amoebae as well as free nuclei were observed.

The author writes that "it is certainly true that *histolytica* forms occur in infections in which most of the entamoebae show the *tetragena* type of nucleus, and the converse is also true." "The *histolytica* type is found in acute primary amoebic dysentery, and in relapses of exceptional severity." "The *tetragena* type is associated with chronic and sub-acute dysenteries." Two types of pathogenic entamoebae were found in mild or in latent dysentery. "When there is a history of recent dysentery, the entamoebae have for the most part the nuclei and cytoplasmic appearance of the small *tetragena* forms; when there is no history of recent acute dysentery, they show the characteristics of the *minuta* type."

As regards chromidia James concludes that "they are derived from the cytoplasm by a process of condensation in the latter, and have nothing whatever to do with nuclear chromatin."

The six plates, of which two are in colours, contain 156 figures.

H. B. F.

ARAGÃO (Henrique de Beaurepaire). **Ueber *Entamoeba brasiliensis*.**—*Memorias do Instituto Oswaldo Cruz*. 1914. Vol. 6. No. 1. pp. 5-10. With 1 plate.

Entamoeba brasiliensis was previously described briefly by the author

in 1912. It occurred in firm faeces of a patient suffering from anaemia due to ankylostomiasis. Additional details with regard to the parasite are now given. The parasites in the faeces were usually encysted; if free they were not active and were about to encyst. Administration of faeces containing cysts per os and per rectum to kittens did not produce infection. Fresh preparations showed the cysts as rounded bodies with a single nucleus, small vacuoles and cell inclusions. Vegetative stages were 10μ to 15μ in diameter, showed finely alveolar cytoplasm, small inclusions and food vacuoles. The nucleus was karyosomatic, but no centriole was seen in it.

The cysts have denser cytoplasm and more obvious inclusions than the free forms. In uni- and bi-nucleate cysts large vacuoles are unusual. The number of nuclei in a cyst varies from 1 to 8. Cysts with 4 nuclei are from 7μ to 10μ in diameter, while those with 5 to 8 nuclei are from 12μ to 15μ . Phases of nuclear division are rare in cysts; the first division only is easy of observation. The karyosome divides first, a tiny but atypical spindle being formed. The remainder of the nucleus then divides also and the nuclear division is repeated. Sometimes the inclusions dwindle, more often they remain. The chromidial masses do not seem to be analogous with those in *Entamoeba tetragena*, but form siderophile threads and bundles. Siderophile threads are often double. The threads may be small or large. Sometimes they stretch across the cyst and divide it into two. This arrangement the author thinks may be significant of sexual evolution in the cyst, preceding copulation. The peculiar thread-like chromidial masses are characteristic of *Entamoeba brasiliensis* and separate it from *E. coli*.

H. B. F.

BAETJER (Walter Albert) & SELLARDS (Andrew Watson). **Continuous Propagation of Amoebic Dysentery in Animals.**—*Bull. Johns Hopkins Hosp.* 1914. June. Vol. 25. No. 280. pp. 165-173. With 1 plate.

A series of interesting experiments is narrated. Two strains of the disease were investigated with the object of securing continuous propagation by subinoculation through a series of animals. The first strain was lost in the second passage by accident. The second was carried through eleven successive passages in kittens. This strain increased in virulence and no degenerative changes appeared in the morphology of the entamoebae obtained at the site of active lesions. The characteristics of the clinical course and pathological lesions were retained throughout the eleven passages. The propagation, however, proved to be considerably complicated by the virulence of accompanying bacteria. The successful propagation of one strain through eleven passages in animals, with an increase in virulence of the entamoebae and a retention of the typical features of their morphology is, the authors believe, in conformity with the general laws of protozoan and bacterial infections.

G. C. L.

MATHIS (C.). **Procédé Rapide de Fixation et de Coloration pour reconnaître aisément les Kystes d'Amibes dans les Selles.**—*Bull. Soc. Med. Chir. de l'Indochine.* 1914. May. Vol. 5. No. 5. pp. 182-185. With 1 plate.

An account is given of a method for the rapid fixation and staining of cysts of entamoebae, the process described taking less than two minutes, an important factor for rapid diagnosis in cases of dysentery. The technique is as follows :—

- (1) A thin smear of faecal matter is made on a slide.
- (2) Immediately, without drying, the slide is placed over a one per cent. aqueous solution of osmic acid for thirty seconds.
- (3) Stain the moist smear with an aqueous solution 1 in 200 of haematoxylin, the solution being that used for Heidenhain's iron-haematoxylin method.
- (4) Wait a few seconds, then cover the smear with a cover glass, pressing out any excess of liquid. Dry the edges with blotting paper.
- (5) Examine direct.

If a permanent preparation be desired, the edges of the cover-slip must be luted with paraffin or other media.

Preparations so made show a brownish cytoplasm and deeper stained nuclei. It is easy to see and to count the nuclei in the cysts, and the cyst walls show clearly. A plate of 23 figures of cysts of *Löschia histolytica*, *L. coli*, *L. legeri* and *Vahlkampfia* sp., showing the characteristic appearances of the cysts, is an illustration of the value of this rapid method of preparation.

H. B. F.

BACILLARY DYSENTERY.

JOB (M. E.). **La Dysenterie Bacillaire dans l'Armée.**—*Arch. de Méd. et de Pharm. Militaires.* 1914. Jan. Vol. 63. No. 1. pp. 57-94; Feb. No. 2. pp. 143-181; Mar. No. 3. pp. 328-359.

In these papers the author gives a very complete summary of the work that has been published on the bacteriology of the dysentery bacilli, their identification, etc. He also discusses the spread of the various epidemics that have been reported, and from these he passes on to various forms of prophylaxis that have been undertaken to prevent such epidemics occurring, and gives at the end of his paper a very long list of references.

These papers are a very valuable contribution; they should be read in the original by all who are interested in the subject of bacillary dysentery.

S. R. D.

KERANDEL. **Dysenterie Bacillaire (Distribution Géographique et Bactériologie).**—*Ann. d'Hyg. et Méd. Colon.* 1914. Apr.-May-June. Vol. 17. No. 2. pp. 462-478.

This is a general text-book account of bacillary dysentery, dealing especially with the bacteriology; it contains no original observations.

It is interesting to note that the author, who evidently possesses a first hand knowledge of the subject, deprecates the terms pseudo- and para-dysentery as designating conditions produced by distinct varieties of the dysentery bacillus. He takes DORTER's view that they are all feebly marked varieties of one and the same bacillus—*B. dysenteriae*.

P. H. B.

SERGEANT (Edm.) & NÈGRE (L.). **Recherches des Bacilles Dysentériques et des Vibrions Cholériques dans les Selles de Pèlerins Musulmans Nord-Africains revenant de la Mecque, Sains en Apparence.**—*Compt. Rend. Soc. Biol.* 1914. June 19. Vol. 77. No. 21. pp. 104-106.

Pilgrimages to Mecca of Mussulmans from the north of Africa were forbidden for some years by the French Government, but in the year 1913 they were allowed again. On the return of these people from Arabia observations were made upon them at the lazaret at Cap Matifou. Carriers of bacillary dysentery and cholera were found, thirteen of the former out of 67 pilgrims, and the authors point out that their researches show that these people, even though they present no special symptoms of these diseases, may nevertheless act as carriers and are thus capable of contaminating their own villages and localities, where sanitary arrangements are not of a high order.

G. C. L.

- i. BLÜHDORN (Kurt). **Das klinische Bild der bazillären Ruhr im Säuglings und Kindersalter.** [The Clinical Picture of Bacillary Dysentery in Infancy and Childhood.]—*Monatsschr. f. Kinderheilkunde.* Orig. 1914. Vol. 13. No. 1. pp. 37-50.
- ii. SCHILD (Rudolf). **Bakteriologischen Befunde bei Bazillenruhr im Säuglings- und Kindesalter.** [Bacteriological Results in the Bacillary Dysentery of Infancy and Childhood.]—*Ibid.* pp. 51-60.

These two papers are concerned with the details of an outbreak of bacillary dysentery, which occurred in the children's ward of the University Clinic at Göttingen in the summer of 1913. The clinical histories of 14 cases are given in full, with observations on the varying character presented by the disease in young children. In two fatal cases the chief pathological change observed in the intestine was swelling and injection of Peyer's patches and the neighbouring lymph-follicles. A diet of whey gave the best results.

Out of 51 samples of stools sent to the laboratory for examination, bacilli referable to a dysenteric type could be isolated only from nine. Numerous tests of the usual kind were applied to the organisms found, for the details of which reference may be made to the original paper.

S. R. D.

BROUGHTON-ALCOCK (W.). **Antidysenteric Vaccination.**—*Brit. Med. Jl.* 1914. Aug. 8. p. 306.

The publication of this paper, which embraces observations which may be of considerable importance in the prevention of dysentery amongst the millions of troops at present in the field, has been precipitated by the present international crisis and may therefore be regarded as of the nature of a preliminary communication.

A twenty-four hours' culture of *B. dysentericus*, preferably the true Shiga strain, on peptone agar is washed in .9 per cent. saline and centrifuged. The resulting deposit is diluted in 2 cc. fresh saline and heated to 56° C. for one hour and enumerated; this amount (2 cc.) is then placed in 20 cc. normal human serum or 10 cc. horse serum. After centrifuging this mixture thoroughly twice the deposit is mixed with .9 per cent. saline, so that 1 cc. of this mixture contains 350 million bacilli to the cc. Preventive injections are made, four at a time, of .25 cc. each into the loose subcutaneous tissue. A second course of 2 cc. (in doses of $\frac{1}{2}$ cc. each) is given eight or nine days later.

The reaction caused by the injection is never severe. Out of a total of 200 subjects so far treated, in an area in which bacillary dysentery is common, not one has so far contracted the disease.

The sera of patients treated in this manner showed no increase of agglutination power to the dysentery bacilli or of specific amboceptor, in this respect differing from the behaviour of human sera injected with untreated bacilli. The author claims for the method described above great simplicity and rapidity in technique, and for the injections both prophylactic and therapeutic properties.

P. H. B.

BARBER (Marshall A.). **The Variability of Certain Strains of Dysentery Bacilli as studied by the Single-cell Method.**—*Philippine Jl. of Science*. Sect. B. Trop. Med. 1913. Dec. Vol. 8. No. 6. pp. 539-557. With 1 plate and 1 text fig.

The following is the author's summary of his paper:—

"1. From a culture of *Bacillus dysenteriae*, Flexner type, derived from a single cell, three series of single-cell isolations were made at intervals of about five months. The first series gave 5 maltose-fermenting variants out of 21 isolations; the second, 5 out of 60; the third, 1 out of 123. The other single-cell cultures as well as the parent culture render maltose alkaline.

"2. The non-fermenting type produces secondary colonies consisting of normal and involution cells, either of which may develop acid- or alkaline-producing cultures. An ordinary transfer from a secondary colony, including many cells of both sorts, gives an acid-forming culture.

"3. Selection from the acid-producing type failed to produce any but similar types, and selection from the alkaline-producing type gave only alkaline, provided secondary colonies were not chosen.

"4. Mixed cultures, consisting of an equal number of cells of each type, showed that the two types may exist side by side through from 10 to 15 daily transfers, but with a tendency for the acid to outstrip the alkaline.

"5. Transfer in maltose broth gave no increase in the acid-producing power except in old cultures.

"6. Growth in various substances other than maltose failed to alter materially the characteristics of the two types.

"7. In a specific serum, the two types showed approximately the same agglutination.

"8. A permanent new race, characterized by morphological peculiarities, was obtained by the selection of an aberrant cell from a culture of dysentery of the Shiga-Kruse type."

A description of the special technique required for making one-cell cultures in series is given, and those interested should consult the original paper for these details.

G. C. L.

JONESCO-MICHAÏESTI (C.) & COMBIESCO (D.). *Sur une Epidémie de Dysenterie Bacillaire chez des Singes Inférieurs.*—*Compt. Rend. Soc. Biol.* 1914. May 22. Vol. 76. No. 17. pp. 827-829.

The authors note that previous workers have studied spontaneous dysentery in *Macacus* monkeys. The organisms isolated belonged in most respects to the Flexner type, but possessed also characters approximating them to the Y type. They have isolated a strain of bacilli which had caused an epidemic of dysentery among monkeys kept in their laboratory (Bucharest) for other experiments. After a short period the monkeys died with classical lesions of the large intestine and mesenteric glands, myocarditis, fatty degeneration of the liver and epithelial nephritis. The contents of the large intestine were sown on Conradi-Drigalski medium and on bouillon bile and an organism was isolated having characters which are described. It is a short bacillus, 1-3 μ long, not staining by Gram and easily cultivated on all the usual media. The authors had at their disposal only two agglutinating serums, one polyvalent, prepared in the laboratory with the bacilli of Shiga, Flexner, Dopter and Duval and the Y bacillus, the other agglutinating only the Shiga type. The authors made agglutination experiments with these serums. The conclusion reached was that according to the majority of the cultural characters the bacillus isolated belongs to a type near to the Flexner bacillus, whereas according to agglutination it approximates to the Strong type.

A. G. B.

FLAGELLATE DYSENTERY.

V. PROWAZEK (S.) & WERNER (H.). *Zur Kenntnis der sog. Flagellaten [Dysenterie].*—*Beihefte z. Arch. f. Schiffs- u. Tropenhyg.* 1914. June. Vol. 18. Beiheft 5. pp. 155-170. [pp. 311-326.] With 1 plate and 1 text fig.

Lamblia and *Chilomastix* (syn. *Macrostoma*, *Tetramitus*) are often seen in the faeces of patients in the hospital of the Tropical Institute at Hamburg.

S. v. Prowazek reviews the occurrence, geographical distribution, morphology and pathogenicity of *Lamblia intestinalis*. The flagellate is 10 μ to 25 μ by 5-8 μ to 12 μ broad. Multiplication cysts contain four nuclei. Binary fission occurs within such cysts. Autogamy stages were not seen. Cats and guinea-pigs may be infected by *Lamblia* cysts, while mice have been found dying of colitis due to *Lamblia*. Faeces containing *Lamblia* are gelatinous, and in the mucus free flagellates and cysts with vacuolated gut epithelial cells occur.

Chilomastix is next considered. The synonymy is complicated. Generic synonyms are *Monocercomonas*, Epstein; *Tetramitus*, Perty; *Macrostoma*, Alexeieff; *Fanapepea*, Prowazek; *Difaemus*, Gäbel; *Cyathomastix*, Rodenwaldt. *Chilomastix mesnili* occurs in man.

Chilomastix flagellates are *Trichomonas*-like, measuring 3 μ to 14 μ by 3 μ to 6 μ . They have a vesicular nucleus containing an oval karyosome. The cytostome is large. There is an undulating membrane, best seen in life, but not always very obvious. Binucleate cysts, about 7 μ long, are found, which give rise by multiple division to tiny flagellates 3 μ to 4 μ long. BRUMPT, NATTAN-LARRIER, GÄBEL, EPSTEIN ascribe pathogenicity to *Chilomastix*.

H. Werner contributes a second section consisting of clinical observations:—

Case 1.—Butcher, aged twenty, infected in Morocco, showing diarrhoeic stools, with mucus and blood. Stools contained *Lamblia*, *Chilomastix* and *Entamoeba tetragena*. Treated in Hamburg with emetin. The drug acted on *Entamoeba*, *Chilomastix* and flagellate forms of *Lamblia*, but the cysts of *Lamblia* were resistant.

Case 2.—Stoker, aged thirty-five. Diarrhoeic stools contained numerous *Dibothriocephalus* eggs and flagellate *Chilomastix*. Extract of male fern caused both the eggs and the flagellates to disappear from the stools.

Case 3.—Indian, aged seventeen. Diarrhoea and fever. *Chilomastix* in stools. Treated with quinine for malaria. The diarrhoea also gradually decreased.

Case 4.—Seaman, aged twenty-six. Taken ill at Rosario. Diarrhoeic evacuations contained *Chilomastix* and *Lamblia* (free and encysted). Treated by Uzara (2 tablets, three times daily), both flagellates disappeared in a few days.

Case 5.—Government assessor in German East Africa, with previous history of dysentery. *Chilomastix*, flagellates and cysts found in the stools. The author considers that the *Chilomastix* here had an etiological significance.

Case 6.—Ship's officer, aged twenty-two. Taken ill with diarrhoea after leaving Bombay Harbour. Stools containing blood and mucus showed *Lamblia* flagellates and cysts and spirochaetes. Treated with emetin. Further details to be published later.

Case 7.—Engineer, aged thirty-five. Dysentery contracted in Natal. *Amoebae* and *Lamblia* flagellates in the stools. Emetin treatment, *Lamblia* cysts resistant.

The pathogenic rôle of the flagellates, in these cases, is difficult to determine, since other organisms were usually present in the digestive tract. These gut flagellates may find suitable conditions of existence in patients suffering also from amoebic dysentery. They may gradually disappear when the patient is sent to bed and put on diet. Uzara and extract of male fern appeared to be useful in certain cases. Emetin is without action on *Lamblia* cysts, though it acts on the flagellates.

H. B. F.

MATHIS (C.). *Troubles Intestinaux dus au Protozoaire Flagellé. Lamblia intestinalis* (Lambl. 1859).—*Bull. Soc. Méd. Chirurg. de l'Indo-chine*. 1914. Feb. Vol. 5. No. 2. pp. 55-62. With 2 plates.

This interesting paper deals with *Lamblia intestinalis*, which can, under certain conditions, excite intestinal complaints in man, giving rise to simple diarrhoea with dysenteriform stools. *Lamblia intestinalis* is fairly common in the digestive tract of Muridae.

FAIRISE and JANNIN (1913) published an account of a case of chronic dysentery due to *Lamblia*, the patient being an old soldier who had served in Indo-China. *Lamblia* were found within the intestinal ulcerations, having penetrated as far as the connective tissue and the muscular layer, a rare condition.

Mathis has observed in Tonkin a number of such cases of diarrhoea. He gives details of four. The first was that of a child three years old. The stools were at first glairy and blood-stained, containing many *Lamblia*, mostly encysted. The flagellates disappeared from the stools after two days. The child's home was infested with mice. The second case, aged four, showed numerous stools with cysts of *Lamblia*, but neither mucus nor blood. The house of the patient harboured

numerous rats. The third case was that of a man aged 29. He had suffered from diarrhoea, with stools containing unidentified flagellates, in May, 1911. There was no further trouble for nearly two years, partly spent in France. In March 1913, there was recurrence of diarrhoea, and *Lambliæ* were found in large numbers in the stools. Daily washings of the intestine with "liqueur de Labarraque" were performed, and the patient underwent a course of further therapeutic and dietetic treatment. In spite of this the *Lambliæ* persisted for at least four months. The fourth patient was 28 years of age and was under treatment for malaria, when he suddenly suffered from diarrhoea, with glairy and bloodstained stools, containing *Lambliæ* cysts. The *Lambliæ* infection lasted for a week.

"To sum up, the troubles due to *Lambliæ intestinalis* are slight," and not as serious as in amoebic dysentery. Prognosis is favourable. Emetin hydrochloride is without action on *Lambliæ*. The parasite should be diagnosed microscopically, a magnification of 400 to 500 diameters being sufficient.

The relative frequency of diarrhoea due to *Lambliæ* in Tonkin is explained by the great abundance of rats and mice, whose dejecta soil unprotected food. According to Noc, the *Lambliæ* may also be water-borne. Healthy carriers of *Lambliæ* cysts also are known, and act as reservoirs of the parasite. Mathis found 5 out of 100 Annamese sharpshooters to harbour the parasite, while Noc in Saigon found 50 per cent. of the population infected.

During a discussion which followed the reading of Mathis's paper, DEGORCE mentioned three cases of chronic diarrhoea in Europeans due to *Lambliæ*, and THIBAUT described a case in a child, probably contracted from mice.

H. B. F.

MARQUES DA CUNHA (Aristides) & TORRES (Magarinos). **Sobre alguns Casos de Colite produzidos pelo *Chilomastix mesnili* (Wenyon, 1910).** [Cases of Colitis due to *Chilomastix mesnili*.]—*Brazil Medico*. 1914. July 22. Vol. 28. No. 28. p. 269.

An account of five cases of chronic diarrhoea in children, apparently caused by *Chilomastix mesnili* (Wenyon), which was found in pure culture in the stools. Two of the children, aged six and eight years respectively, had suffered from a benign form of looseness of the bowels for a long time, while two others, of one and three years of age, developed the same symptoms on coming to reside with the elder ones. The fifth case, observed subsequently, was also in a child, eighteen months of age, and a native of the same locality. Nothing is said about the treatment. These are the first cases of the kind observed in Brazil. A detailed study of the material obtained is reserved for a future communication.

J. B. N.

DERRIEU & RAYNAUD (M.). **Dysenterie Chronique à Flagellé Nouveau.**—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 571-574.

The authors give an account of a case of chronic dysentery due to a new flagellate, which they name *Hexamastix Ardin-Delteilii*. The patient, aged 42, a cellarer, lived at Oued-el-Alleug, Algiers, and was

treated at the medical clinic of Mustapha in December 1913, for chronic diarrhoea and general weakness. The history of the patient is given.

In February 1913 he suffered from abdominal pains with abundant diarrhoea, seven to eight stools in 24 hours being passed, but they were neither mucoid nor blood-stained. They ceased after four days. About March 30th a shivering attack occurred, followed by fever every two days for a fortnight. Icterus appeared with highly coloured urine and two pale liquid stools were passed daily. After fifteen days the fever ended, but the patient still remained a little yellow and there was pain on the right side. The stools increased to 15 per day, and were less copious and muco-sanguinolent. The patient suffered from pain in the pit of the stomach and rectal tenesmus. After treatment with quinine in the hospital at Blidah he was slightly better, but the diarrhoea reappeared after he left hospital and did not cease.

The patient, when admitted to hospital at Mustapha, was very emaciated and feeble, with a muddy complexion, a dry, scaly skin, hippocratic (clubbed) fingers and myoidema. He complained of constant thirst and his breath smelt of acetone. His tongue was smooth, red, coated, and a little dry. His digestion was not good. Slight retraction of the stomach occurred and aortic pulsations were felt in the epigastric region. Pressure over most of the colon was painful. Twenty to thirty stools in 24 hours were passed, with anal smarting. Slight hypertrophy of the liver occurred. The spleen was normal. There was anaemia. The serum did not agglutinate the bacilli of Flexner or Chantemesse-Shiga.

Various unsuccessful treatments by ipecacuanha, collargol, neosalvarsan, urotropine and sulphate of soda were carried out till February 2nd, 1914, when ESCOMEL's treatment for *Trichomonas* dysentery was tried—2 gm. turpentine by the mouth and three enemata daily of the following mixture:—

Essence of turpentine	..	..	..	20 drops.
Laudanum	..	..	..	10 drops.
Yolk of egg	..	..	..	1 ..
Distilled water	..	..	..	250 cc.

By the 10th February the treatment was stopped, the patient being completely cured.

Examination of Stools (Fresh). If examined immediately a hot stage was not necessary. Actively motile oval elements as large as a leucocyte were seen. In rapid movement neither flagella nor undulating membrane could be distinguished, but when movement slowed after 15 to 30 minutes it was easy to see these structures. In some cases the oval body was prolonged into a tail. The organisms usually encysted in 20 to 30 minutes. The parasites were numerous but disappeared after turpentine treatment. No other parasites were seen in the stools.

Stained preparations. Wet fixation over bromine vapour for about 15 minutes was best. Giemsa stain was used. The parasite measured 10 to 15 μ long by 9 to 13 μ broad. Nucleus and blepharoplast were present. Close to the blepharoplast arose an undulating membrane terminating in a flagellum, as well as five flagella varying in length from 10 to 17 μ . There was also an axostyle. The parasite is allied to *Trichomonas intestinalis*, but is distinguished by the constant presence of five flagella.

The flagellate dysentery due to *Hexamastix ardin delteilii* is probably epidemic in the country where the man dwelt. The authors state that essence of turpentine seems to be a specific for this malady.

H. B. F

ASSMY. **Zur Frage der Emetinbehandlung der Lamblienruhr.** [Treatment of *Lamblia*-Dysentery with Emetine.]—*München. Med. Wochenschr.* 1914. June 23. Vol. 61. No. 25. pp. 1393.

A case of *lamblia* dysentery in a Chinaman is recorded. A few active *lambliae*, many cystic forms and spirochaetes were found in the dysenteric stools. The condition of the patient materially improved and all protozoal parasites disappeared from the faeces on no other medicament than a suitable diet and daily doses of magnesium sulphate. The author thinks, therefore, it would be unwise to claim any specific action for emetine, such as in the case reported by Martin MAYER [see this *Bulletin*, Vol. 3, p. 466].

P. H. B.

ARDIN-DELTEIL, RAYNAUD, COUDRAY & DERRIEU. **Un Cas de Dysenterie à *Balantidium coli*.**—*Bulls. et Mém. Soc. Méd. des Hôpit. de Paris.* 1914. July 9. Vol. 30. No. 24. pp. 2-6.

The authors describe in this paper what they consider to be the first record of balantidial dysentery in French literature. The description of the patient's (an Algerian native's) clinical symptoms is given in great detail and calls for little comment. The stools were frequent and were composed of bloodstained mucus. There was great tenesmus. Microscopical examination revealed large numbers of very active balantidia. Neither the administration of emetine hydrochloride nor of protargol had any influence on the parasites.

[As the patient suffered from pulmonary tuberculosis of the right apex, the clinical picture may have been complicated by tubercular ulceration of the intestinal tract.]

P. H. B.

MIXED & UNCLASSED DYSENTERY.

DEEKS (W. E.). **Dysenteries in the Canal Zone, with Special Reference to Amoebic Dysentery.**—*Ann. Trop. Med. & Parasit.* 1914. July 22. Vol. 8. No. 2. pp. 321-352.

The term dysentery designates a condition in which there are frequent movements of the bowels attended generally by griping pains and tenesmus; in the ensuing dejecta are to be found blood, pus and mucus. The following forms of dysentery are more or less frequently met with in Ancon hospital and can for the most part be readily differentiated.

(1) Amoebic dysentery caused by the *Entamoeba tetragena* of VIREECK, or the *Entamoeba histolytica* of SCHAUDINN.

(2) Bacillary dysentery caused by SHIGA's or FLEXNER's bacillus and allied varieties.

(3) Bilharzia dysentery caused by *Schistosomum mansoni*.

(4) *Balantidium* dysentery caused by the *Balantidium coli*.

(5) Malarial dysentery in the course of a general malarial infection.

(6) Tubercular dysentery due to tubercular ulceration of the intestine.

(7) Nephritic dysentery, or dysentery associated with acute diffuse nephritis, or secondary to chronic nephritis.

(8) Diphtheritic dysentery or colitis, associated with a diphtheritic or gangrenous inflammation of the mucous membrane—a very fatal form.

(9) Dysentery in the course of pellagra.

(10) Dysentery resulting from the ingestion of decomposing meats or fish, or infected milk (probably a bacillary infection).

(11) Dysentery secondary to cardiac or hepatic disease.

(12) Dysentery associated with typhoid ulceration.

(13) Clinical dysentery of undetermined etiology, cases of which occur in large numbers in the Canal Zone, especially in the month of May.

During the years 1911 and 1912 out of 334 cases of dysentery admitted to the Ancon hospital 63 were of amoebic origin.

Etiology of dysentery due to the Entamoeba histolytica. Evidence collected in Panama points to the probability of the transmission of the infection by means of uncooked vegetables. There is evidence also that water is a possible source of infection: since the water supply has been installed in Panama and the cisterns have been abolished, amoebic dysentery has almost disappeared; prior to this the water supply was derived from water tanks and wells in the yards and there was no sewerage system. The only recent cases Deeks has attended in Panama were among those who have abandoned the regular water supply for cistern water. There appears to be no endemic centre. Every village on the Isthmus contributed one or more cases, generally in proportion to the population. Though cases occur in every month of the year, the greatest prevalence is in March, April and May.

Pathology. The lesions are most common in the caecum and sigmoid, but in severe cases the whole colon, sigmoid, rectum and even a small portion of the ileum adjacent to the caecum may be involved.

It is possible that incidental infections, such as those of *Trichocephalus*, *Ankylostoma*, *Ascaris*, *Oxyuris* and *Bilharzia*, while bearing no relation to the presence or development of entamoebae, may, by causing minute lesions of the mucosa, assist the entrance of these pathogenic organisms. Should the physiological function of the bowel be interfered with by extensive dysenteric lesions, stools consisting of blood and mucus will result; while should only one or more small ulcers exist, the bowel is able to maintain its functions with the passage of formed and even constipated motions.

Symptomatology. Latency was a marked feature of the cases and it is interesting to note that two were operated upon for chronic appendicitis. The clinical forms met with can be divided into acute and chronic types.

The author lays stress on the doughy, inelastic skin, which is invariably present in amoebic dysentery and which he considers of diagnostic and prognostic importance, though it is by no means peculiar to amoebic ulceration.

The course of the acute infections is variable; they may prove fatal in a few days with a sloughing, gangrenous or perforated bowel and a subsequent secondary infection. In some of these cases, before the fatal termination takes place, entamoebae are carried in great numbers to the liver and myriads of small necroses result. The leucocytosis is variable and cannot be considered characteristic. Twenty-three per cent. of the deaths were due to complicating liver abscess—single or multiple.

Treatment. The methods of treatment adopted need only be briefly discussed, as the results obtained, though excellent in themselves, have been surpassed since the introduction of emetine. The administration of bismuth subnitrate in heroic doses (180 grs.) every three hours night and day, together with saline or plain water irrigation of the bowel three times daily, gave the best results. Deeks is of the opinion that the curative power of bismuth subnitrate rests largely

on its antiseptic action on the symbiotic putrefactive or fermentative bacteria, or it may be, according to JAMES's work, a direct action on the entamoebae themselves. Five cases treated in this manner showed symptoms of poisoning. The patients became cyanotic with faint pulse and recovered at once after the administration of magnesium sulphate. These toxic phenomena are ascribed to the liberation of nitrous oxide or a similar gas into the blood through the decomposition of the bismuth salt.

In exceptional cases in which there is a marked degree of emaciation and exhaustion, open caecostomy, as performed by HERRICK, is advocated.

The case mortality of treated cases was 5.4 per cent. Out of the 66 cases whose subsequent records could be traced three, or 4.5 per cent., relapsed after bismuth subnitrate treatment; similarly metastatic hepatic abscesses were very rare.

The frequency of abscess in the liver and its comparative absence in other organs, save when secondarily infected from the liver, can best be explained on the theory that in the liver cell a medium suitable for the development of the entamoebae is elaborated, while in the intestines these organisms are apparently symbiotic with micro-organisms.

Bacillary Dysentery.—Only four positive cases, that is cases in which a definite dysentery bacillus—the Y bacillus—was isolated, have been noted. In one the organism was recovered by DARLING and BATES in a blood culture four days before death.

The patients suffering from this form were more prostrate than the ordinary amoebic cases. The temperature was higher and the stools contained more blood.

The best results in treatment were obtained from the use of opiates after a preliminary dose of calomel or salts, or castor oil. The beneficial action of the opiates is ascribed to the lessening of peristalsis and of consequent dissemination of the organisms into the deeper tissues.

One autopsy showed shallow, coin-shaped ulcers in the colon, appendix and small intestines, and also in the sigmoid colon where a perforation had taken place. The heart valves showed acute and chronic endocarditis; there was also acute nephritis, multiple splenic infarcts, and acute lymphadenitis of the mesenteric, mesocolic, inguinal and femoral glands. [All these different lesions are ascribed to the action of the dysentery bacillus, though there appears to be little or no evidence of this origin.]

Bilharzia dysentery.—During 1911 three cases of [presumably rectal] bilharzia infection were admitted to Ancon hospital, and during 1912 six who passed blood and pus in their stools. One died after five and a half months in hospital unrelieved by any remedy. At the autopsy, which has already been reported by Dr. S. T. DARLING, the large intestine and especially the rectum were ulcerated and thickened and riddled with suppurating sinuses, one of which had perforated and set up a general purulent peritonitis.

Balantidium dysentery.—In Ancon hospital ten to fifteen cases of balantidial infection of the stools are met with yearly and may or may not be associated with dysenteric symptoms. No pathogenic properties are ascribed by Deeks to this organism and no cases in which it occurred have proved fatal.

Malarial dysentery.—During the years 1911 and 1912 twenty-four cases occurred; all recovered on quinine treatment.

Tubercular dysentery.—This may occur in the course of a general tubercular infection or the ulceration may be limited to some part of the intestinal tract. The diagnosis can only be made on the persistence of symptoms and on the presence of acid-fast bacilli in the stools.

Nephritic dysentery.—During the past year there were twenty-five admissions to Ancon hospital with five deaths from this type of dysentery; two were associated with acute, three with chronic nephritis.

Clinically the cases which are associated with acute nephritis are very asthenic, toxic in appearance, and run a normal or subnormal temperature. The abdomen is retracted, the bowel not perceptibly thickened and the skin inelastic; the watery stools are numerous and contain much blood.

As a general rule the patients recover without much permanent renal damage resulting. The etiology is obscure, though in some the condition seems to bear a definite relation to malarial infection. It may be, the author suggests, that an unsuitable sweet carbohydrate diet is a determining factor. Pathologically the ulcerative lesions are not confined to the caecum and colon, but may involve the small intestine as well. In treatment frequent administrations of magnesium sulphate gave the best results.

Diphtheritic colitis.—Four deaths occurred from this disease in the years 1911 and 1912. At the autopsy a grey slough covers practically the whole of the mucous membrane of the large and a small part of the adjacent small intestine. No cultures have been made to determine the causative organism. The condition is apparently always fatal. Clinically the patients show extreme prostration with high fever and frequent bloody motions.

Dysentery in the course of pellagra.—Nearly every one of the seventeen admissions for pellagra exhibited dysenteric symptoms. Out of five fatal cases, only three showed ulceration of the bowel. A carbohydrate-free diet with dilute nitric acid between meals brought about a speedy convalescence.

Dysenteries resulting from the ingestion of decomposing meat, fish, milk, etc.—After the ingestion of decomposing proteids a severe and fatal enterocolitis results, due probably to *Proteus vulgaris*, *B. coli*, *B. enteritidis* and allied organisms.

[Certain warrantable criticisms may be launched at the latter part of this paper. There is little to show, in view of the incompleteness of the bacteriological examination of dejecta and post mortem material, which the author admits, that the so-called nephritic dysentery, diphtheritic colitis, the dysentery occurring in the course of pellagra, food poisoning, and heart disease are not, so far from representing distinct types, due etiologically to the same organism, *Bacillus dysenteriae*, which, as is well known, too often occurs as a terminal infection in the course of some other chronic debilitating disease. There also appears to be little justification for making generalised statements with regard to the differentiation of amoebic and bacillary infections from the macroscopic appearance of the stools and of the lesions post mortem, arguing from such a small series of cases. These may vary indefinitely according to the site and severity of the lesions in any given case.]

P. H. B.

MARTINI. Ueber Ruhr im Deutschen Schutzgebiet Kiautschou und in Schantung. [Dysentery in the German Protectorate of Kiaochau.]—*Jl. of State Med.* 1914. June. Vol. 22. No. 6. pp. 356-359.

A summary of work done in the bacteriological laboratory at Kiaochau during the years 1908-09-10, on the organisms causing the local forms of dysentery. *Entamoeba histolytica* was the sole cause of amoebic dysentery, and was isolated in from 25 to 30 cases in each year. For bacillary dysentery, figures can be given for the year 1910 only, owing to want of a proper supply of reliable sera in previous years; B. Shiga-Kruse was isolated eight times, B. Flexner seven times and the Y bacillus nineteen times.

S. R. D.

LIBIERATOS (S. G.). Ἡ ἐπιδημική δυσεντερία [Epidemic Dysentery].—*Ἀρχαία Ἱατρικὴς* [*Archives de Médecine.*] 1914. May 1-10. Vol. 9. Nos. 13 & 14. pp. 129-144, and No. 15. May 20. pp. 150-153.

A lecture on dysentery, of a purely didactic character, delivered to an audience of army surgeons by Professor Libieratos. While summarizing the whole subject in a very masterly manner, it does not apparently pretend to add anything original to our knowledge of the diseases comprised under this heading, and therefore need not be analysed at length.

J. B. N.

HORNUS (P.). Note sur les Dysenteries observées dans la Région de Fez.—*Arch. de Méd. et de Pharm. Militaires.* 1914. July. Vol. 64. No. 7. pp. 1-17. With 2 curves.

From August 20th–November 20th, 1913, the author treated nearly 200 cases of dysentery in Morocco (122 of amoebic and 78 of bacillary origin).

[The differential diagnosis of the two forms of the disease appears to have been made on the macroscopical appearances of the stool as well as on the clinical symptoms and history of the patient. Every worker on this group of diseases recognizes how utterly fallacious are macroscopic observations for differential diagnosis unless carefully confirmed by laboratory tests.]

P. H. B.

i. SEYFFERT. Bericht über Uzara bei Amöbenruhr. [Report on Uzara in Amoebic dysentery].—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. June. Vol. 18. No. 12. pp. 415-421.

ii. LINSKER (J.). Ueber erfolgreiche Anwendung von Uzara bei der Ruhrepidemie in Uhelna Bezirk Stryj. [On the Successful Employment of Uzara in an Epidemic of Dysentery at Uhelna (Galicia).]—*Med. Klinik.* 1914. May 31. Vol. 10. No. 22. pp. 937-938.

i. A report on the cases of six native policemen treated in the native hospital at Aruscha, German East Africa, with Uzara.

The author's conclusion is that Uzara is a drug which has a prompt remedial action in cases of acute amoebic dysentery. It combats the toxic action of the amoebae, reducing both colic and diarrhoea ; but it cannot be called amoebicidal, and is therefore comparatively useless in the chronic forms of the disease.

ii. The author employed Uzara, chiefly in the form of the liquor supplied by the makers, in 80 cases of bacillary dysentery, after trying other remedies with poor results, and speaks very highly of its action. Of the 80 cases, 50 were in children and the remainder in adults. The dose of the liquor given ranged from 5 to 30 drops three times daily.

S. R. D.

CHOLERA.

SIMOND (P. L.) & PASTEUR VALLERY-RADOT avec la Collaboration de KIAMIL BEY & ASSEO (Raphaël). *Notes sur le Choléra à Constantinople et en Thrace, de 1910 à 1913.*—*Bull. Soc. Path. Exot.* 1914. Apr. Vol. 7. No. 4. pp. 313-357. With 1 plate, 1 map & 1 text fig.

From the 13th September to the 31st December, 1910, 1,284 cases of cholera occurred in Constantinople and its environs; of these 753 died. In 1911 the cases were few, while again in 1912 from November 5th to December 31st, 2,260 cases occurred, with 1,123 deaths. In 1913 a further small recrudescence of the disease occurred, during which an epidemic of 14 cases occurred in an asylum.

The water of the city is drawn from various sources, one being the lake of Derkos and another the forest of Belgrade. The district of Derkos was early infected with cholera, but the water from the lake was never shown bacteriologically to be specifically contaminated. Both water supplies were badly distributed, however, and showed a high bacterial count. From a consideration of the distribution and occurrence of the cases, water could be definitely excluded as playing any part in producing any of the epidemics. Contact with patients, infected objects, soil and excreta were the essential causes at work. The authors describe the disease as being essentially associated with dirty hands. A marked lowering of the temperature was on several occasions associated with the cessation of an epidemic, but whether this acted directly on the organism outside the body or indirectly through its effect on carriage of infection by flies was not determined.

The contagion was brought to Constantinople usually by fugitives or soldiers returning from infected areas in Thrace. It was taken to Thrace by the troops sent to the front from Anatolia. In October 1912 cases occurred in the regiments of the Turkish army situated at Lule Burgas and, in the retreat which followed the Bulgarian attack, the disease increased so that from the 20th to the 30th November several thousand new cases appeared daily.

The bacteriological examination of the faeces revealed many spiral forms in association with the cholera vibrio, but since these forms are also present in amoebic dysentery the authors suggest they are saprophytes of the intestine and of no great importance. 2,669 contacts were examined for vibrios and 63 of them were found to be carriers.

A table is given showing the average titre of patients' serum in positive cases from the first to the 53rd day, from which it appears that the average titre is very variable and erratic.

Several erythematous rashes were seen during the epidemics; they occurred in the stage of reaction and were usually (77 per cent.) morbilliform in character, though scarlatiniform, purpuric, papular and polymorphic eruptions were also met with. They commenced generally on the arms and generalised in 24 to 48 hours. They were red on first appearing and became violet by the third to fifth day of their existence and finally a little brownish. Desquamation occurs. 25 per cent. of the cases with morbilliform eruption died.

W. J. Penfold.

ECKERT. **Die Rolle der Kontaktinfektion in der Epidemiologie der Cholera.** (Nach in Bulgarien gesammelten Erfahrungen). [Contact Infection in the Epidemiology of Cholera].—*Berlin. Klin. Wochenschr.* 1913. Dec. 15. Vol. 50. No. 50. pp. 2326-2328.

The author was engaged last year in a cholera hospital in Sophia and formed one of a mission of four German doctors engaged by the Bulgarian Government for anti-cholera work. The explosive outbreak of cholera in the Bulgarian army at Tschataldscha appears to have been a chief cause of the arrest of the Bulgarian advance.

The incidence of the disease in the army of Bulgaria has been variously stated at from 16,000 to 29,600 cases with 6.2 per cent. of deaths. The main cause of the spread of the infection was the neglect of the recruits to use the latrines provided in the camps; they contaminated the ground throughout the camps with dejecta and in removing their shoes and clothing the hands were infected. Washing seems to have been a luxury in the camps. In this way a contact infection (in the wide sense) of large numbers of men in an explosive manner occurred. Water infection did not appear to play a part in the spread of the epidemic.

The army when transferred through Macedonia to fight against the Serbs and Greeks infected the country in its passage. Owing to the army's close proximity to Sophia and to the large number (40,000) of Macedonian refugees accumulating in the latter the capital became infected. Sophia is efficiently sewered and has an excellent water supply from the neighbouring hills. It is exceedingly clean. Up to the end of September 800 cases of cholera had been diagnosed in the town, but the great majority of them were imported and owing to the good hygienic conditions obtaining in the town no marked tendency to local spread of the disease developed. Contact infection was not observed amongst the personnel of the cholera hospital at Sophia. The apparent contradiction between the importance of contact infection at Tschataldscha and its unimportance in Sophia is explained probably by quantitative considerations. In Sophia, owing to good hygienic conditions, doses of virus would be relatively small and therefore ineffective, while at Tschataldscha the converse would hold.

W. J. P.

BABES (V.). **Studien über Cholerabekämpfung.** [Studies on the Control of Cholera].—*Zeitschr. f. Hyg.-u. Infektionskr.* 1914. May 27. Vol. 77. No. 3. pp. 501-533.

The author assisted in the anti-cholera campaign (1913) in the Bulgarian territory occupied by the Roumanians. Many of his conclusions as to the relative merits of different factors in the campaign are not absolutely proved, but must be rather looked on as impressions derived, after considering the local circumstances, from a large number of more or less independent observations.

The vaccination of the civil population against cholera was undoubtedly effective. To obtain the best results large doses of vaccine were required, vaccination had to be repeated, and it had to be widespread.

Vaccination with one dose appeared to predispose to attack during the two days immediately succeeding it. During the 8-10 next following days marked immunity resulted, after which occasional cases again occurred. In the first days after the second dose of vaccine occasional cases of cholera arose, but practically none later.

Vaccination appeared useless in the treatment of carriers. Carriers did not subsequently develop the disease itself. Cholera vaccine in treatment did not favourably influence the mortality, though it promoted diuresis and improved the general condition of the patient. The author tested a number of cholera strains as to their ability to produce severe reactions and also to call forth large quantities of protective substances. The strain giving the least reaction and most protection was fixed on for the vaccine. The author is opposed to polyvalent vaccines in the case of the *V. cholerae* or *B. typhosus*.

The method used for the quick identification of the *V. cholerae* was as follows. The material was grown 4 hours in alkaline peptone water, then subcultured on to agar, on which it was allowed to grow for 6 hours, then agglutination tests were applied. The diagnosis required 11 hours. Of the carriers discovered 95 per cent. did not carry more than 4 days after their discovery. Not one of them subsequently took cholera, nor was there much evidence that they spread the disease. Many cases occurred in which individuals free from the specific germs on one day, as far as could be ascertained by the examination of excreta, showed the disease the next day. The author believes the incubation period of cholera to be 1-2 days, not 5 days as frequently stated. Infected water was frequently shown to cause local outbreaks of cholera.

W. J. P.

CASTELLI (A.). *L'Epidemia Colerica del 1912 nella Provincia di Cagliari [Sardinia].—Annali d'Igiene Sperimentale.* 1914. Vol. 24. (Nuova serie.) No. 2. pp. 245-268. With 4 figs. and a chart.

The epidemic lasted from the 4th of August to the 27th October. The bulk of the cases were in the city. The cause of the epidemic was obscure, but it seemed probable that it was related to that of the previous year, the virus being dormant during the intervening months. The foci in the city were four in number. No quarter was entirely free. 4,089 examinations of material were made by the Communal laboratory.

The city had a total of 100 cases during the epidemic, of which 61 were notified in the ordinary way, 12 were recognised in hospital, and 27 were only recognised post mortem; 49, 37, and 14 were the numbers of cases occurring in the months of August, September and October respectively. Of these cases 55 proved fatal. One hundred and seven carriers were discovered, of whom 28 suffered from a slight diarrhoea with no other symptoms. Cholera affected females more than males. The males were more affected in infancy and the females in the age period 20-40 years.

The vibrio was recovered up to the 36th day in the case of actual patients and up to the 16th day in the case of carriers, but usually it persisted only about four days. In the province outside the city only ten cases occurred, and the infection in them was traceable usually to the city cases.

The bacteriological technique and results were in no way remarkable. Two non-agglutinating vibrios were isolated which did not acquire agglutinating properties, though treated in various ways which have been shown to restore agglutinating power. In the cholera cases which were not very grave the agglutinating titre of the patients' serum reacted from 1-100 to 1-1,000.

W. J. P.

SERGEANT (Edm.) & NÈGRE (L.). **Recherches des Bacilles Dysentériques et des Vibrions Cholériques dans les Selles de Pèlerins Musulmans Nord-Africains revenant de la Mecque, Sains en Apparence.**—*Compt. Rend. Soc. Biol.* 1914. June 19. Vol. 77. No. 21. pp. 104-106.

In search for the *V. cholerae* the authors examined the stools of 67 pilgrims returning to North Africa from Mecca and found three of them to contain vibrios. Two of these grew on peptone water, potato and gelatine as the *V. cholerae* and also agglutinated with a specific serum to 1-2,000 dilution. They gave Pfeiffer's reaction and were not haemolytic to sheep's red cells. They gave the cholera red reaction. The other vibrio was strongly haemolytic; it did not agglutinate nor give Pfeiffer's reaction. The danger of these carriers from the public health standpoint is pointed out.

The same patients were examined for dysentery carriage; these results are summarised on page 312.

W. J. P.

BARBER (M. A.). **Cockroaches and Ants as Carriers of the Vibrios of Asiatic Cholera.**—*Philippine Jl. of Science.* Sect. B. Trop. Med. 1914. Feb. Vol. 9. No. 1. pp. 1-4.

The fact that cockroaches are liable to become contaminated with human faeces and to creep over human food, depositing their faeces upon it, suggested to the author that they might be cholera carriers, and he determined to test this view.

The species used was *Periplaneta americana*, and all were winged adults. Hungry insects were fed on cultures or on faeces from human cases. The insects fed on cholera faeces showed specific vibrios in the stools in from 6 to 79 hours after feeding. They were often present in enormous numbers in an actively motile state. In some cases the vibrios disappeared from the insect's faeces in about thirty hours from the time of feeding; at other times they persisted for some time. A series of results is given dealing with the longevity of the cholera germs of human and insect faeces when placed on different varieties of foods. The cockroaches were liable to vomit, and the vomited matter was found to contain living vibrios up to one hour after feeding. The vibrio does not lose its virulence for the guinea-pig by passage through the gut of the cockroach. Evidence is brought forward that red ants (*Monomorium latinode*, Mayr) are probably also efficient carriers of cholera.

W. J. P.

CREMONESE (Guido). **Un Segno Clinico Patognomonic del Colera Asiatico.** [A Clinical Sign Pathognomonic of Asiatic Cholera.]—*Policlinico*. Sez. pratica. 1914. May 31. Vol. 21. No. 22. pp. 784-785.

The author had experience of cholera in the province of Rome in 1911. The short note describes three facial appearances in cholera patients.—

1. An earthy appearance of the face.
2. A lividity around the eyes, especially below the lower lid. This is more constant than sign 1, but is observed also in non-cholera diarrhoea.
3. A brilliant white pearly colour of the eyelids, especially of the lower, making the eyes appear large and bright. The author believes this appearance of the eyes characteristic of cholera. It is most valuable in the initial stages, but not as reliable in advanced cases.

W. J. P.

CADBURY (Wm. W.) & HOFMANN (J. Allen). **Epidemic Cholera in Canton, China.**—*China Med. Jl.* 1914. May. Vol. 28. No. 3. pp. 165-172.

The paper gives the results of treating cholera in lunatic patients with ROGERS's hypertonic saline injections. The patients were lying on the floor and all apparatus used was improvised; nevertheless, the results were exceedingly good. Six to ten litres were injected in the course of the treatment of any one case. The indication that enough had been given was the flow of fluid from the mouth and rectum. If in spite of the injection the blood pressure remained below 95 mm. of mercury and the urine was scanty, then the patient invariably died. Of 27 patients transfused 74 per cent. recovered; of 17 patients not transfused only 35 per cent. recovered and it must be noted that several of these were not transfused because the attacks appeared mild. The chief causes of death were collapse and uraemia. A table is given showing the mental state of the patients, number of transfusions and duration of the illness.

W. J. P.

DUBALEN. **Adrénaline et Choléra. Extrait du Rapport Annuel de 1912 de la Province de Soairing (Cochinchine).** [Clinique d'Outre-Mer.]—*Ann. d'Hyg. et Méd. Colon.* 1914. Apr.-May-June. Vol. 17. No. 2. pp. 590-592.

Adrenalin treatment gave, in the hands of the Tunisian physician who advised it, 100 per cent. of recoveries in 20 cases treated. The author of the present note treated 166 cases thus and had 43 deaths, 26 per cent. In a control series of 1,115 treated by ordinary methods no fewer than 69 per cent. died. In neither series was hypertonic saline or anticholera serum used. The dose of adrenalin given was 2 mgm. intravenously or 3-5 mgm. subcutaneously. Theoretical considerations which suggested that the treatment might be of value are discussed.

W. J. P.

SELLARDS (Andrew Watson). **The Relationship of the Renal Lesions of Asiatic Cholera to the Ordinary Nephritides with Especial Reference to Acidosis.**—*Amer. Jl. Trop. Diseases & Prevent. Med.* 1914. Aug. Vol. 2. No. 2. pp. 104-116.

The increase of tolerance of the body to bicarbonate, found in the uraemia of cholera, is also present in nephritis from other causes. The author attributes this increased tolerance to acidosis, and discusses the causes of the acidosis at some length, without however producing any new experimental work on the subject. The causes of increased excretion of ammonia in cholera are also discussed. The results obtained at Manila by treating cholera cases with intravenous injections of sodium bicarbonate and acetate solutions are set out in tables. These show that deaths from uraemia are almost entirely avoided by this method of treatment.

The author recommends intravenous injections of a half per cent. sodium bicarbonate solution given in saline in quantities of two litres. This is to be repeated until the urine becomes alkaline or polyuria develops. The author finds that 100 grams of bicarbonate may be required in two or three days. The solution should be sterilised in tightly stoppered bottles in an atmosphere of carbon dioxide and kept stoppered till ready for use. It is also possible to get fresh stocks of pure bicarbonate in small sterile containers; these can be used without sterilisation.

W. J. P.

SAVAS (C.). **Ueber die Choleraschutzimpfung in Griechenland.** [Cholera Immunization in Greece.]—*Wiener Klin. Wochenschr.* 1914. July 23. Vol. 27. No. 30. pp. 1093-1098.

This paper gives the results obtained from vaccinating about half a million people in Greece—soldiers, civilians and refugees. During the Greco-Turkish war no cholera occurred in the Greek army, but in the Greco-Bulgarian war, on the other hand, cholera was very prevalent. The total number of cases in the army and amongst the Greek civil population was about 5,700, of which 1,700 were fatal.

The vaccine used was made according to the method of KOLLE, and where possible two doses were given. The vaccination diminished the incidence of the disease greatly. Of 114,803 soldiers 8,968 were not inoculated, 14,613 were inoculated once and 91,224 were inoculated twice. The incidence of the disease amongst the uninoculated was 93 per thousand, amongst those inoculated once 42 per thousand and amongst those inoculated twice 7 per thousand. Separate figures dealing with the incidence of the disease amongst the attendants and nurses of cholera patients give similar results.

Amongst the cholera-infected it was found that the mortality of the unvaccinated was 27.5 per cent., among those vaccinated once only 12.2 per cent., and of those vaccinated twice it was 10.2 per cent. The general impression obtained by the doctors dealing with the civil population was similar to the statistical results carefully collected by the medical staff of the army.

W. J. P.

CARDAMATIS (J.). Τα πεπραγμένα ἐπὶ τῆς ἐν Μακεδονίᾳ χολέρας κατὰ τὸν Ἑλληνο-βουλγαρικὸν πόλεμον. [The Measures taken against Cholera in Macedonia during the Graeco-Bulgarian War.]—*Ἱατρικὴ Προόδος*. [*La Grèce Médicale*.] 1914. Mar. 1-15. Vol. 19. Nos. 5-6. pp. 91-98.

The author gives an account in this paper of the measures taken by the Greek authorities to prevent the spread of cholera in Southern Macedonia after the retreat of the Bulgarian army. Besides the usual steps with regard to disinfection and the care and isolation of the sick, for which the services of the local medical practitioners were enlisted, a special staff of eight medical officers was told off to vaccinate compulsorily the whole population with cholera vaccine. Previous to the arrival of the commission in the district there had been about 450 cases of cholera with 260 deaths, but the figures were difficult to obtain with exactitude. By the time the whole of a population of 50,000 persons had received two inoculations apiece, and in some cases three, the disease had disappeared, and the author is disposed to attribute this result in great measure to the compulsory inoculation.

The vaccines used were obtained from different sources, and the doses used ranged from one-sixth of a gramme for a child of three months old to half a gramme for an adult, the interval of time between the two doses varying from 6 to 30 days, according to circumstances. The place of injection as a rule was the outer and posterior aspect of the upper part of the left arm, but in the case of a certain number of Mohammedan women the injection was made into the forearm. Considerable reaction, with nausea and transient fever, occurred in nearly all the cases. Patients suffering from acute diseases and those with heart or kidney disease were exempted from inoculation. The seat of injection was always first washed with soap and water and then dried with alcohol, or else painted with iodine, and the needles of the syringes, in order to save time, instead of being boiled after each injection, were wiped with a plug of cotton wool dipped in alcohol. Not a single case of suppuration was noticed. In malarial patients, the inoculations seemed to precipitate febrile attacks, but in children suffering from such diseases as measles and whooping-cough no effect upon the course of the disease was observed.

By means of judicious addresses to the assembled villagers and lectures on the subject of cholera to the more educated inhabitants of the various districts, resort to the provisions of military law was almost entirely avoided.

J. B. Nias.

CARDAMATIS (Jean P.). Rapport sur la Lutte contre le Choléra en Macédonie pendant la Guerre Greco-Bulgare.—*Bull. Soc. Path. Exot.* 1914. May. Vol. 7. No. 5. pp. 447-459.

Anticholera vaccination was largely used by the author and his assistants in Macedonia. The vaccines used were obtained from Germany and Switzerland at the commencement of the campaign, but later on from Athens only. The dose for adults was 0.75 cc. on the first occasion, 1.5 cc. on the second occasion. The vaccination was compulsory from the age of three months upwards. Over 100,000 vaccinations were done and no case of suppuration occurred. Syringe needles were not boiled between injections but simply wiped with cotton wool soaked in alcohol.

The plan of campaign in a village was as follows :—A general meeting was called of all inhabitants, the priest and other chief men of a village being held responsible for the completeness of the meeting. A lecture was then given on the nature and transmission of the disease, on the methods of sanitation, on the penalties incurred by those who concealed cholera cases or cholera infected clothing, etc., on the value and compulsory character of anticholera vaccination and on the treatment of the disease.

A commission of hygiene of each village was appointed which exercised the usual powers of a public health authority. The doctors of each locality were assembled separately and districts for vaccinations were assigned to them and all information as to treatment of cases, disinfection and the like given to them. The immediate after effects of the vaccination were as a rule trifling; 15 per cent. however had feverish attacks and 5 per cent. had diarrhoea. A large number, 41 per cent., had slight local pain. A few cases of nettle rash were seen following the injections. Tables are given suggesting that the vaccination reduced the incidence of the disease and the mortality from it, but they are not above criticism. Tables are given showing the effect of vaccination during and just before menstruation.

W. J. P.

SLATINEANO (A.) & MIHAIESTI (C. J.). **Note sur la Vaccination Anticholérique. Absence de Sensibilisation.**—*Compt. Rend. Soc. Biol.* 1914. May 8. Vol. 76. No. 15. pp. 698-699.

The authors believe, from their work with the Roumanian army, that the vaccination of carriers of cholera germs is quite safe.

In their first series 250 carriers were vaccinated. They received two doses, 3 and 5 cc. respectively, with an interval of five days between the doses. The injections were always given intramuscularly. The carriers reacted to the vaccine with local pain and transient fever and general malaise exactly as the normal controls. No vomiting or diarrhoea resulted from the vaccination. A second series of 125 carriers gave the same result.

The average duration of the carrier state in these cases was two to four weeks.

W. J. P.

BALTEANO (J.) & LUPU (M.). i. **Recherches Expérimentales, chez l'Homme, sur la Production des Agglutinines et des Précipitines dans le Sang des Individus vaccinés contre le Choléra.**—*Compt. Rend. Soc. Biol.* 1914. May 1. Vol. 76. No. 14. pp. 680-682. With 1 curve.

ii. **Bactériolysines et Sensibilisatrices du Sang après la Vaccination Anticholérique.**—*Ibid.* pp. 683-684. With 2 curves.

iii. **Symptomatologie des Vaccinations Anticholériques.**—*Ibid.* June 26. Vol. 77. No. 22. pp. 174-176. With a chart.

i. The authors vaccinated with a Kolle vaccine three groups of individuals

The first group of two persons had one dose of vaccine. The second group of four persons had each two doses, and the third group of four persons had three doses each. The interval between injections was seven days. In six of the ten persons the normal serum agglutinated the specific vibrio in 1/10 dilution. In those having one injection an agglutinin titre of 1/20 occurred after 24 hours, three days later it fell to 1/10 and then after 48 hours commenced to rise again to attain its maximum on the 24th day (1/130). It then very gradually fell. The serum of individuals with two or three injections obtained a slightly higher agglutinating titre (1/150), and it remained high for seven days and then commenced to fall.

The precipitin content of the patients' serum varied exactly as the agglutinin content. No negative phase appeared after the second or third injections in any case.

ii. The lysin was tested for by the *in vitro* method. The mixture of inactive serum, antigen and complement was allowed to stand one hour in the incubator at 37° C. In individuals receiving one injection the lysin appeared four days after inoculation and attained its maximum after 56 days. The rise was not uniform during the interval; an actual fall in bacteriolytic power occurred about the 20th to the 30th day. The bacteriolytic titre was found to have remained high three months after the inoculation had been made. In the case of the individuals receiving multiple doses the content of lysin increased more quickly, attained a greater height and kept up longer. In the case of the complement fixing amboceptor as studied by Bordet-Gengou's reaction, the curve was entirely different. In the case of patients receiving one dose of vaccine the amboceptor content of the serum reached its maximum after eleven days from the time of infection, and after remaining high for five days rapidly fell.

iii. The vaccine was always given into the triceps. Heaviness and pain in the limb supervened in three or four hours and movements of the shoulder joint became difficult. These symptoms attained their maximum at the eighth hour and disappeared in 24 hours. Oedema and redness appeared at the point of inoculation. Local suppuration never occurred, but slight axillary adenitis was common. Three to four hours after vaccination a fever reaction set in and attained its maximum about the tenth hour. It rarely exceeded 39° C. Polyuria frequently followed the vaccine while anuria was rare. Ten cases had the urine regularly examined and showed no albuminuria or casts. One person, however, the subject of chronic nephritis, died of uraemia on the sixth day after injection. Diarrhoea is not infrequent after cholera vaccination; sometimes nausea occurs and even vomiting.

Cholera vaccination occasionally lights up old rheumatic mischief in joints. A polynuclear leucocytosis was found to follow each dose of vaccine. The reaction in children is slight. Two women succumbed to cholera shortly after vaccination. The cholera started in one case four, and in the other six, hours after the administration of the vaccine.

CICCONARDI (Giuseppe). **Modificazioni funzionali prodotte dalle Tossina Colerica sui Vari Sistemi dell'Organismo.** [The Effect of Cholera Toxin on the Bodily Functions.]—145 pp. With 32 figs. Napoli: Stab. Tip. Francesco Lubrano. Summarised in *Sperimentale*. 1914. Mar. 30. Vol. 68. No. 1. pp. 69-116.

The author, working in GALEOTTI's laboratory, Naples, has studied the effect of cholera toxin on the organism, and has come to the conclusion that all the clinical manifestations of the disease can be fully explained on the ground that they are due to the toxin. The toxin he used was the toxic nucleo-proteid prepared by a method similar to that used by GALEOTTI in his study of plague intoxication. The cholera strain used was virulent to guinea-pigs. It was grown in broth in 300 cc. quantities for fourteen days at 37° C. A minimal lethal dose of the toxin was difficult to determine, but a few milligrammes killed rabbits of middle weight. The death occurred rapidly on intravenous injection, slowly on intraperitoneal injection. The power of the toxin in lowering the temperature of the animal was very marked, 28° C. being registered before death in the case of the rabbit. Guinea-pigs were less affected in this way. The toxin causes convulsions in the later stages, and during this time the temperature rises. When the temperature is falling the heat given out by the animal is also markedly diminished, so that the heat production is evidently at fault.

The cholera toxin has a marked action on the isolated heart; it causes sudden slowing of the beat and irregularity. The force of the heart may not be immediately diminished, but may, on the other hand, be augmented. The ventricles usually cease to contract before the auricles. Death of the heart occurs about half-an-hour after the toxin is added to it. The toxin appears to affect the nervous mechanism of the heart rather than its muscular fibres. The toxin causes in the rabbit a marked fall of blood pressure and slowing of the pulse. The respiratory rate during this time may be increased or diminished. Attempts were made to determine the action of the toxin on the arteries of the ox, but the results were not decisive. The blood changes produced in the rabbit by the toxin are not very marked. Slight apparent increase of reds occurs, due to peripheral stasis. Leucocytosis occurs. The polymorphs are increased, and in one case an intense eosinophilia was observed. Hurried, laboured respiration occurred under the influence of the toxin, and also different types of irregular breathing. Respiratory paralysis frequently caused death. The action of the toxin on the kidney vessels depends on the dose, and the suppression of urine does not appear to be secondary to the action on the vessels. The cholera toxin augments the peristalsis of the gut. The investigation suggested that all the clinical features of the disease may be reasonably explained by believing it to be an intoxication with this nucleo-protein.

W. J. P.

VIOLLE (H.). **Sur la Pathogénie du Choléra.**—*Compt. Rend. Acad. Sciences*. 1914. June 8. Vol. 158. No. 23. pp. 1710-1711.

The author brings forward experimental facts to show that diminution of the bile plays an important part in the production of cholera.

He experimented on rabbits and dogs, and the chief results are as follows.—

Cholera culture introduced directly into the intestine does not cause cholera.

Cholera injections after augmenting or diminishing the pancreatic juice in the intestine are also ineffective in causing cholera.

If, on the other hand, the common bile duct be tied and cholera culture in small doses be injected into the intestine below the entrance of the pancreatic duct, typical cholera results. If the common bile duct be tied and immediately below its entrance into the gut cholera culture be injected, cholera does not result.

In the case of animals which took the disease from the use of the above described successful method (eight out of nine) the typical post mortem appearances of cholera were present.

Cholera toxin, injected intravenously, diminished the secretion of bile. The author finds that a preliminary dose of such toxin, followed by inoculation of cholera culture directly into the gut below the entrance of the pancreatic duct, causes cholera. He concludes that the bile is a natural protection of the body against cholera.

W. J. P.

NASTA (M.). Choléra Expérimental chez des Cobayes ayant reçu préalablement une Injection de Sérum Entérolytique.—*Compt. Rend. Soc. Biol.* 1914. June 26. Vol. 77. No. 22. pp. 177-178.

The mucous membrane of guinea-pig small intestine was washed and emulsified in isotonic saline. This emulsion was injected subcutaneously into a rabbit. Six injections were given at intervals of a week. The serum so obtained was slightly haemolytic and caused slight bloody diarrhoea when injected intraperitoneally into guinea-pigs. To healthy guinea-pigs a preliminary dose of this enterolytic serum was given, followed in two hours by cholera culture. No alkali was given to the animal. Marked falls of temperature followed with death in 20 to 36 hours. The experiments were done in fasting animals.

Post mortem the typical appearances of cholera were found.

W. J. P.

GOLDBERGER (Joseph). Some New Cholera Selective Media.—*Treasury Dept. U.S. Public Health Service, Hygienic Laboratory Bull.* No. 91. 1913. Dec. pp. 19-39.

The paper is introduced by a useful summary of the literature dealing with selective cholera media. The alkaline peptone agar of CRENDIROPOULO and PANAYOTATOU was found by the author to have little restraining effect on ordinary faecal bacteria. The alkaline egg peptone agar of KRUMWIEDE, PRATT and GRUND was found to restrain not only the ordinary faecal bacteria, but also the *V. cholerae* itself, so that disappointing results were obtained with it. Goldberger, however, confirmed the fact that the cholera organism grows on the egg medium with a very characteristic hazy appearance. He therefore tried to modify the K. P. G. egg medium so as to retain the distinctive appearance of the colony and at the same time make it highly selective. His best modification was obtained by mixing in suitable proportion

alkaline egg solution with meat extract glucose agar. This mixture restrains ordinary faecal bacteria very well, though *B. pyocyaneus* and *B. faecalis alkaligenes* are fairly resistant to its inhibitory action. The *V. cholerae* and some non-cholera vibrios grow exceedingly well on it. A medium in which the egg solution was replaced by alkaline meat infusion gave almost identical results. The author also introduces a new enrichment solution. This is kept in two fractions and mixed as required: (a) alkaline-egg solution, (b) peptone water. This enrichment medium restrains the *V. cholerae* a little, but the other intestinal bacteria very markedly, so that it is altogether more effective than the usual peptone water enrichment method. It is unsuitable for the recovery of the *V. cholerae* from sewage, as members of the *Proteus* group present overgrow the cholera germ.

W. J. P.

FÜGNER (Ignaz). Ueber den modifizierten Dieudonnéschen Cholera-nährboden von Hoffer und Hovorka. [The Modified Dieudonné Culture Medium of Hoffer and Hovorka.]-*Centralbl. f. Bakt.* 1. Abt. Orig. 1914. June 13. Vol. 74. No. 3/4. pp. 354-365.

On preliminary testing of the Hoffer-Hovorka medium Fügner found that it was extremely antagonistic to laboratory cholera strains. After much trouble he showed this to be due to the fact that the crystal violet alkaline blood agar had not been boiled before the plates were poured. After a preliminary boiling for 15-20 minutes the medium gave excellent results. Cholera strains were a little more inhibited by it than by Dieudonné's medium, but non-cholera organisms in general were much more inhibited by it than by Dieudonné's medium.

Stools from a case of febrile enteritis had varying quantities of cholera culture added to them and comparative platings on Dieudonné's and on the Hoffer-Hovorka media were made. In 62 comparative experiments Dieudonné's plates gave 33 successes, while the Hoffer-Hovorka plates gave 60 successes. The cholera colonies on this new medium are very easily recognised owing to the complete or almost complete suppression of other bacteria. The agar for this new medium must be used fairly fresh. The chief defect of the Hoffer-Hovorka medium is that it cannot be used immediately after pouring the plates, but must, like Dieudonné's, be kept for some time. Attempts to do away with this difficulty by the addition of lactic acid were not successful.

W. J. P.

POPOFF-TCHERKASKY (Dora). Quelques Observations sur la Morphologie et la Biologie du *V. cholerae* (Koch) Buchner isolé pendant la Guerre des Balkans. -*Centralbl. f. Bakt.* 1. Abt. Orig. 1914. July 16. Vol. 74. No. 5/6. pp. 382-392. With 1 text fig.

The author examined (1912-1914) 37 strains of *V. cholerae* isolated in Sophia from the faeces of Bulgarian or Turkish soldiers. The method of isolation employed showed nothing new. Dieudonné's medium appeared to be valuable.

The agglutination test was applied to the cultures on the 18-hour old Dieudonné plates. The cultures obtained were examined again after six to eleven months and no variations of the agglutination

character were found. The morphology of the organisms on isolation was fairly constant, a short stumpy rod, very slightly curved, the middle portion thick with extremities pointed or rounded. Four to nine months after isolation many involution forms appeared, micrococci, spirals, globose swollen and thickened forms.

All the 37 strains showed only one cilium. This agrees with GOTTSCHLICK's results and it appears probable that earlier statements to the contrary may have been due to imperfect recognition of the organism.

Gelatine plate cultures at 20° C. showed small white granular colonies, as if powdered with glass, which soon became surrounded by a zone of liquefaction. Alkaline potato cultures showed after 18 hours at 37° C. white glassy layers which later took on a yellow brown colour.

In milk five of the 37 strains gave no coagulation, while the rest caused coagulation in three to eleven days. On solidified blood serum during fifteen days' observation all but seven strains liquefied the medium. The time of onset of liquefaction was, however, variable.

On blood media the author was unable to confirm KRAUS's results as to absence of haemolytic power in the case of strains of true cholera, no less than 30 strains showing definite haemolysis within 48 hours on sheep blood agar plates. While the author is acquainted with the variations of the agglutinating power of true cholera, she holds agglutination to be the most reliable test in the recognition of strains.

W. J. P.

CRASTER (C. F.). **The Recognition of the Cholera Vibrio.**—*Jl. Experim. Med.* 1914. June. Vol. 19. No. 6. pp. 581-592.

After discussing the literature of the cholera-like vibrios the author gives some interesting experimental results. A series of these organisms after five passages through guinea-pigs was found to have acquired in marked degree positive specific agglutination reactions. In the case of two of the strains the agglutination at the commencement was not positive in a higher dilution of serum than 1-100, while after passage it was positive in a serum dilution of 1-2,000. The virulence to animals did not increase markedly in these cases and in no case was a positive Pfeiffer's reaction obtained with these modified organisms. Some of the modified strains, however, were susceptible to bacteriolysis by a specific serum *in vitro*. No control experiments are given to show that the original strains were not similarly susceptible.

The author dwells on the importance of the fact that absence of agglutination in the case of a vibrio does not negative the possibility of its being a cholera vibrio.

W. J. P.

COURMONT (J.), LESIEUR (Ch.), DUFOUR & MARCHAND. **Etude Anatomo-Clinique et Bactériologique de Nouveaux Cas Lyonnais d'Entérite Estivale Cholériforme et Dysentériforme à Microbes Spirales.**—*Bulls. et Méms. Soc. Méd. Hôpit. de Paris.* 1913. Dec. 25. 3 sér. Vol. 29. No. 38. pp. 848-855. With 1 text fig.

Two cases are described resembling cholera, from which the specific vibrio could not be recovered. Both these cases showed large numbers

of spiral forms in the gut and the authors are inclined to believe the spirals are of great significance. The first case started with colic and nausea; this was followed by profuse diarrhoea, algidity, prostration, pain in the epigastrium, vomiting, cramps and hypothermia, the patient dying on the fifth day of the disease. Post-mortem congestion of the intestine, most marked in the case of the large intestine, was found and the contents of the gut at this level were of a rice grain like character.

Bacteriology. The direct smears of intestinal contents showed no vibrios but a great number of fine spiral forms 10-12 μ long. Attempts at cultivation of the spiral forms did not succeed. The ordinary methods for the recovery of the vibrio cholera were tried without success. Proteus and coliform organisms were cultivated. The spirals in direct smears stain by dilute carbol-fuchsin and do not retain Gram's stain. The second case was very similar. A resumé of the literature on spirillary forms found in the gut is given and the many different opinions of the authors as to their significance discussed. Nothing definite seems to be known concerning their pathogenicity in man at present.

W. J. P.

SLEEPING SICKNESS.

BRUCE (David), HAMERTON (A. E.), WATSON (D. P.) & Lady BRUCE.
Morphology of Various Strains of the Trypanosome causing Disease in Man in Nyasaland: The Human Strain (continued). VI to X.
—*Proc. Roy. Soc.* 1914. Sept. 15. Vol. B 88. No. B 602.
pp. 190-205. With 9 Charts.

Reference is made to a previous paper in which five strains of the trypanosome infecting man in Nyasaland are described [see this *Bulletin*, Vol. 1, p. 659]. In this paper results of examination of another five strains are given. Strains VII, VIII and X were inoculated directly into the rat from which the drawings and measurements were made. In Strains VI and IX a single monkey intervened. Strains were thus obtained under fairly similar circumstances. A table is given showing the passages of all ten strains through animals between man and the rat, whose trypanosomes were drawn and measured in the case of each. The authors write:—"On comparing the curves from the ten strains it cannot be said that the passage from dog to rat, or from monkey to rat, or direct from man to rat, has had any marked influence on the character of the curve. But in these cases only a single monkey or dog intervened."

Biometric curves constructed from the measurements of 500 individuals of each of the five strains taken on nine consecutive days from the rat are given.

A number of experiments were made to ascertain whether inoculating animals with a single trypanosome gave rise to an infection of the original dimorphic type. Single trypanosomes were picked out by means of dilution and capillary tubes. In this manner six experiments, three of which were successful, were performed. In each case the long and slender form of trypanosome was isolated and injected. Biometric curves were constructed from the resulting infection in rats. Short and stumpy, intermediate, and long and slender forms were found. Among the short and stumpy there was a large percentage of the blunt-ended posterior-nuclear forms. The authors consider that from these experiments it can be concluded that in the dimorphic trypanosome causing disease in man in Nyasaland we have to deal with the single species. In the following table measurements of the length of the trypanosomes of the five strains are given.

A similar table is given comparing measurements of the breadth of the trypanosomes of the five strains.

The authors have constructed a curve showing the distribution by percentages in respect of length of 2,500 individuals of the "Human" strains VI to X. This curve is very similar to that made from strains I to V except that it lies a little to the shorter side.

In each of the five strains posterior nuclear forms were found among the short and stumpy varieties. In Strain VI, 14.3 per cent. of the stumpy forms exhibited the posterior nucleus; in Strain VII, 13.4 per cent.; in Strain VIII, 24.2; in Strain IX, 28.6 per cent., and in Strain X, 5 per cent.

Table XXII.—Measurements of the Length of the Trypanosomes of the Five Human Strains VI to X. The trypanosomes have been taken from the rat alone.

Date.	Strain.	Name.	Number of Trypanosomes measured.	In microns.		
				Average length.	Maximum length.	Minimum length.
1913	VI	Manakumpara	500	21·7	32·0	15·0
1913	VII	Yoramu	500	22·5	34·0	16·0
1913	VIII	Mekka	500	22·4	33·0	16·0
1913	IX	Mkanthama	500	21·2	33·0	14·0
	X	Dongolosi	500	23·5	32·0	17·0
				22·3	34·0	14·0

The following is the conclusion :—

“ These further five strains of this trypanosome, isolated from five natives in Nyasaland, belong to the same species, *Trypanosoma brucei vel rhodesiense*, the trypanosome causing disease in man in Nyasaland.”

W. Yorke.

BRUCE (David), HAMERTON (A. E.), WATSON (D. P.) & Lady BRUCE.

The Trypanosome causing Disease in Man in Nyasaland. II. The

Wild-game Strain. III. The Wild *Glossina morsitans* Strain. Part

II.—Susceptibility of Animals. *Proc. Roy. Soc.* 1914. Sept. 15.

Vol. B 88. No. B 602. pp. 205-212.

In this paper the action on animals of the “ Wild Game ” Strain and the “ Wild *Glossina morsitans* ” strain is given and they are compared in this respect with each other and with the “ Human ” Strain. The results are given in detail in the form of tables and are summarised as follows :—

Table XI.—The Average Duration, in Days, of the Wild-game, Wild *Glossina morsitans* and Human Strains of the Trypanosome causing Disease in Man in Nyasaland, in regard to their Virulence towards Various Animals.

Strain.	Ox	Goat.	Monkey.	Dog	Rabbit.	Guinea-pig.	White rat.
Human	134	42	26	34	28	67	30
Wild Game	—	46	38	41	—	—	32
Wild <i>G. morsitans</i> ..	Rec.	54	38	29	47	81	26

Table XII.—The Percentages of Recoveries in Various Animals of the Wild-game, Wild *Glossina morsitans* and Human Strains of the Trypanosome causing Disease in Man in Nyasaland.

Strain.	Ox.	Goat.	Monkey.	Dog.	Rabbit.	Guinea-pig.	White rat.
Human	80	0	0	0	0	0	0
Wild-game	—	0	0	0	—	—	0
Wild <i>G. morsitans</i> ..	100	6	7	4	0	0	0

The following are the conclusions :—

" 1. The pathogenic action on various animals of the Human strain, the Wild-game strain and the Wild *G. morsitans* strain is so much alike, that it may be concluded that they all three belong to the same species of trypanosome.

" 2. This species is *T. brucei vel rhodesiense*, the trypanosome causing disease in man in Nyasaland."

W. Y.

BRUCE (David), HAMERTON (A. E.), WATSON (D. P.) & Lady BRUCE.
The Trypanosome causing Disease in Man in Nyasaland: The Liwonde Strain. Part I.—Morphology. Part II.—Susceptibility of Animals.—*Proc. Roy. Soc.* 1914. Aug. 27. Vol. B 88. No. B 601. pp. 97-111. With 5 charts.

This strain was obtained in the "Fly area" of the Upper Shire Valley. At the time it was procured, no cases of Sleeping Sickness had been reported from this district. Lately, however, cases have been discovered in Mpimbi in the south of the district. Three dogs infected with the wild *Glossina morsitans* strain of the trypanosome, were taken to Kasu, and other animals—monkeys, dogs and rats—inoculated from them. For purposes of description, measurement and comparison, only trypanosomes from rats were used.

Posterior nuclear forms were found in considerable numbers as is shown in the following table :—

Table XV.—Percentages of Posterior-nuclear Forms found among the Short and Stumpy Varieties of the Trypanosome of the Human, Wild-game, Wild *Glossina morsitans*, and Liwonde Strains.

Date.	Strain.	Animal.	Percentage among short and stumpy forms.
1912 ..	Human	Rat.	17.8
1912 ..	Wild-game	"	26.2
1912 ..	Wild <i>G. morsitans</i>	"	12.5
1913 ..	Liwonde	"	19.8

Average 19.1

The pathogenicity of each of the three strains in goats, monkeys, dogs, guinea-pigs and rats is given in three tables. The authors write :—

" The infection set up in the various animals by the Liwonde strain gave rise to symptoms and appearances during life, and pathological changes in the various organs after death, alike and similar in every way to those caused by the Human strain, Wild-game strain, and the Wild *G. morsitans* strain of *T. brucei vel rhodesiense* found in the 'Proclaimed Area.' "

The conclusions are :—

" 1. The three wild *G. morsitans* strains from the Liwonde district resemble each other closely, and all belong to the same species of trypanosome.

" 2. The Liwonde strain belongs to the same species as that occurring in man, wild game, and wild *G. morsitans* inhabiting the 'Proclaimed Area,' Nyasaland—*T. brucei vel rhodesiense*.

" 3. Hence it would appear that wild *G. morsitans* occurring in a district 100 miles south of the 'Proclaimed Area' are infected with the trypanosome which causes the human trypanosome disease of Nyasaland."

W. Y.

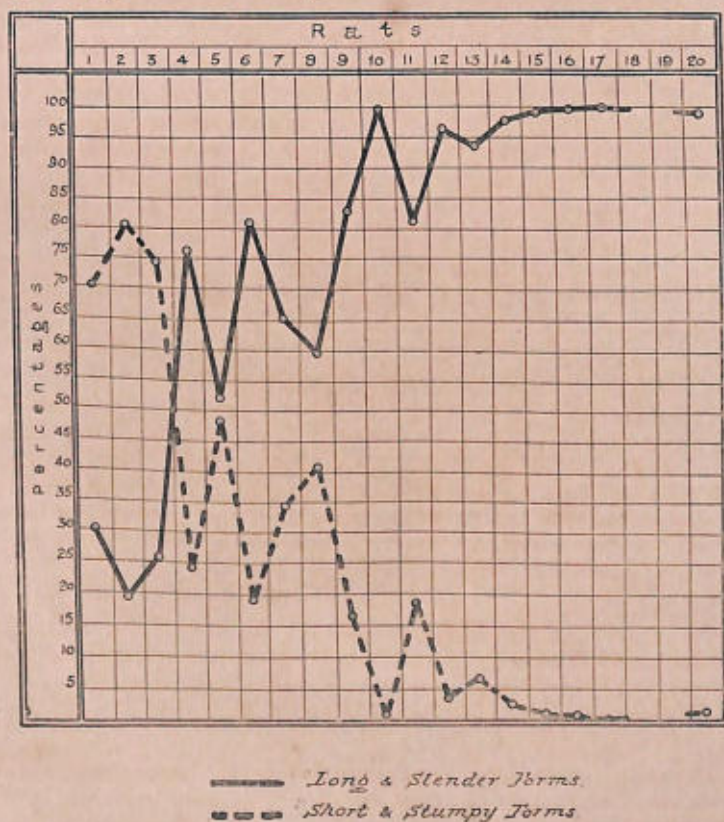
BRUCE (David), HAMERTON (A. E.), WATSON (D. P.) & Lady BRUCE.
The Trypanosome causing Disease in Man in Nyasaland. The Naturally Infected Dog Strain. Part I.—Morphology.—*Proc. Roy. Soc.* 1914. Aug. 27. Vol. B 88. No. B 601. pp. 111-130.
 With 3 plates and 8 charts.

This strain, known as "The Naturally Infected Dog Strain," has been found three times in dogs in the Proclaimed Area. It differs so much from the others that it is doubtful if it should be included among the various strains already described, viz.:—"Human," "Wild Game," "Wild *G. morsitans*," and "Mzimba."

This "Naturally Infected Dog Strain" is almost harmless to monkeys and guinea-pigs. Moreover, there is a comparative absence of the blunt-ended posterior-nucleated forms. As a result of these differences, the strain is described fully and completely.

Large numbers of trypanosomes were measured and the results are set forth in tables and biometric curves. The proportion of posterior-nuclear forms found among the short and stumpy varieties of the trypanosome in one of the earlier infected rats was 7 per cent., whereas, after passage of the strain through rats for 7 months, it was only 1.3. After passage through rats for two years the short and

* Curves representing the Gradual Change of this Trypanosome from a Dimorphic Type to a Monomorphic.



* Reproduced by permission from the *Proceedings of the Royal Society.*

stumpy forms had nearly all disappeared and with them the posterior nuclear forms. Dealing with the comparison of the morphology of the "Naturally infected dog strain" with the other strains of trypanosome causing disease in man in Nyasaland, the authors state that it is impossible to separate the "Naturally infected dog strain" from the others by microscopic examination, but there were very few posterior-nuclear forms and as a rule, the thick blunt-ended type was not so common as in the others. How this aberrant strain arose in these three chronically infected dogs, it is impossible to say. It was not found anywhere else. Possibly, the long sojourn in the blood of the dog had modified and weakened the strain and attempts were made to prove this but without success, as all dogs inoculated with the ordinary strain died in a few weeks and inoculations from those which lingered longest showed no signs of weakening or change of any kind.

The conclusions are :—

" 1. The Naturally Infected Dog Strain differs slightly from the other strains of the trypanosome causing disease in man in Nyasaland, in that there are fewer of the posterior-nucleated, blunt-ended forms which are sometimes so much in evidence in the ordinary strains.

" 2. Taking into consideration the fact that this strain was only found in three chronically infected dogs, it is concluded that it is an aberrant strain of the widely spread species *T. brucei vel rhodesiense*, the trypanosome causing disease in man in Nyasaland."

Part II.—Susceptibility of Animals.—*Ibidem.* pp. 130-138.

In tables, results of inoculation of various animals are given.

Only one of four oxen became infected and parasites were seen on but three occasions in this ox and then in scanty numbers. The animal was still alive and in perfect health after 335 days. The trypanosome had little effect on goats. Not a single animal of the 21 inoculated died of the disease and 12 proved refractory. Of two sheep, one died after 64 days and the other recovered. Twenty-seven monkeys were inoculated; six became infected and recovered and the remainder were refractory. After several passages the strain became virulent to dogs; of the 28 used for experiments, 19 died on an average in 36.8 days (11 to 102), four never showed trypanosomes in their blood and five recovered. The post mortem appearances were identical with those found in nagana—enlargement of the spleen, gelatinous oedema about the vessels at the base of the heart, petechiae of mucous membranes, and corneal opacity. Two rabbits were inoculated and both died—one after 109 and the other after 256 days; both exhibited corneal opacity and presented the same symptoms as those described in nagana rabbits but in a much milder degree. Guinea-pigs proved almost refractory to this strain; only 2 of 21 animals inoculated showed trypanosomes. Parasites were seen on one occasion only and the animals appeared to have recovered, as sub-inoculated rats remained unaffected. Of 48 white rats which were inoculated, all died. The duration of the disease was on an average 30.8 days (7 to 94). There was an enlargement of the spleen and the blood swarmed with trypanosomes. The authors write :—

" This shows the great difference in regard to action on animals which exists between the Naturally Infected Dog strain and the Human strain, and if similar tables referring to other strains—for example, the Zululand

1913 Strain—be compared, the same difference is found. It might be said that this alone is sufficient to make it rank as another species, and, as already mentioned, if this strain had been found among the wild game and wild *Glossina morsitans* in Nyasaland, this would have been justified. It was, however, only found in three chronically infected dogs, and so it is thought best with our present knowledge to include it among the strains of *Trypanosoma brucei vel rhodesiense*.

"If in the future it should be decided to give it specific rank the name *T. anceps* is suggested. This name seems appropriate on account of the uncertainly which exists as to the classification of this trypanosome."

The conclusions are :—

"1. The Naturally Infected Dog strain is fatal to dogs, rabbits, and white rats, but oxen, goats, monkeys, and guinea-pigs appear to be refractory.

"2. The Commission is of opinion that this is an aberrant or exceptional variety or strain of the trypanosome causing disease in man in Nyasaland—*T. brucei vel rhodesiense*."

Part III.—Development in *Glossina morsitans*.—*Ibidem*. Sept. 15.
No. B 602. pp. 213-218.

A short account of the development of the trypanosome in *Glossina morsitans* is given; it was found that this was precisely similar to that of the "Human Strain" of the trypanosome.

Eleven experiments were conducted with laboratory-bred flies—two were positive and nine negative. Of the 376 flies used, 14 were found to be infected. This small percentage (3·7 per cent.) is partly due to the fact that in some of the experiments few or none of the flies were dissected. Details of the experiments are given in the following table :—

Table I.—Laboratory-bred Flies.

Date.	Expt.	No. of flies used.	Experiment positive or negative.	No. of flies dissected.	No. of infected flies found.	No. of days before flies became infective.	Temperature at which flies kept.
1912.							
Sept. 7	1257	25	—	25	0	..	84° F. (29° C.)
Oct. 23	1499	26	—	26	1	..	"
Dec. 3	1668	10	—	10	0	..	"
1913.							
Jan. 13	1753	50	—	18	0	..	84° F. (29° C.)
Mar. 24	2018	55	—	18	2	..	"
April 7	2067	30	+	30	3	24	"
May 9	2018 _A	40	—	36	7	..	"
June 13	2226	40	—	8	1	..	"
July 21	2303	40	—	29	0	..	"
Aug. 30	2394	40	+	0	0	58	"
Nov. 12	2433	20	—	15	0	..	"

In the two positive experiments, 24 and 58 days respectively elapsed before the cycle of development of the trypanosome was complete in *Glossina morsitans*. In Experiment 2067 three infected flies were found, but in only one were the salivary glands invaded. In Experiment 2394 a positive result was also obtained but the flies were not dissected. The types of trypanosomes found in the infected flies were

identical with those observed in the development of the trypanosome causing disease in man in Nyasaland and also in that of "*T. brucei*, Zululand, 1913."

The conclusion is :—

"The trypanosome of the Naturally Infected Dog strain belongs to the same group as *T. gambiense* and *T. brucei vel rhodesiense*, the trypanosome causing disease in man in Nyasaland, and is probably merely a weak strain of the latter species."

Part IV.—Experiments on Immunity.—*Ibidem.* pp. 219-226.

The experiments described in this paper were undertaken to ascertain whether animals which had recovered from the "Naturally Infected Dog Strain" were immune to the different strains which have been described in previous papers as the "Human," "Wild Game," "Wild *Glossina morsitans*," "Zululand 1913," etc. There were practically no recoveries from the "Human" and other strains and hence there were no complete cross-inoculation experiments. One goat apparently recovered from the Mzimba strain and a goat, monkey and dog from the "Wild *Glossina morsitans*" strain and these were included, but apart from them the only animals which recovered were those infected with the weaker "Naturally Infected Dog Strain." Details of the experiments are set out in 18 tables. As a result of this work it was found that the "Naturally Infected Dog Strain" failed to immunise animals against the "Human," "Wild *Glossina morsitans*," and "Zululand 1913" strains, but it was not determined whether the latter strains would have immunised animals against the "Naturally Infected Dog Strain."

The following are the conclusions :—

"1. The Naturally Infected Dog strain does not protect animals from the Human, Wild *G. morsitans*, and Zululand, 1913, strains.

"2. The Wild *G. morsitans* strain and the Naturally Infected Dog strain do not protect animals from the Human or the Zululand, 1913, strain.

"3. The Wild *G. morsitans* strain does not protect against the Human strain.

"4. In spite of the damaging evidence of these experiments, the Commission still holds the opinion that the Naturally Infected Dog strain is a weak strain of the trypanosome causing disease in man in Nyasaland, *T. brucei vel rhodesiense*."

W. Y.

BRUCE (David), HAMERTON (A. E.), WATSON (D. P.) & Lady BRUCE.
Trypanosomes found in Wild *Glossina morsitans* and Wild Game in the "Fly-Belt" of the Upper Shiré Valley.—*Proc. Roy. Soc.* 1914. Aug. 6. Vol. B 88. No. B 600. pp. 38-41.

The fly area to which this paper refers extends along the Shiré River from Lake Pamalombe to the Murchison cataracts. Although it is thickly populated, human trypanosome disease, though probably existing, has not yet been discovered in the district.* Cattle cannot be kept, and goats and dogs are constantly destroyed by trypanosomiasis, so that they have to be continually imported from the highlands. Game is very abundant, particularly in the dry season when herds of eland, koodoo, waterbuck and impala concentrate in

*As stated on page 340 human trypanosomiasis has been found in the south of this district.

the vicinity of the river. In the wet season, elephant and buffalo are met with. The fly area is crossed by two of the most frequented roads in Nyasaland—that running from Zomba to the north and the main road from Liwonde to Fort Johnston.

The method employed in the feeding experiments was the same as that described in a previous paper [see this *Bulletin*, Vol. 2, p. 234], except that monkeys were unobtainable and the flies were fed only twice on each animal.

It was found that the "fly" in the Upper Shiré district carried the same four species of trypanosomes as those found in the Proclaimed Sleeping Sickness area, viz.—*T. brucei vel rhodesiense*, *T. pecorum*, *T. simiae* and *T. caprae*. In a series of seven experiments all the animals on which flies were fed became infected. In six the dogs were infected with *T. brucei vel rhodesiense*; in the second and fifth there was a double infection with *T. pecorum*, and in the seventh infection with *T. pecorum* alone. None of the goats was infected with *T. brucei*, but six with *T. pecorum*, one with *T. simiae* and five with *T. caprae*.

The blood of a number of game—zebra (1), impala (7), koodoo (2), waterbuck (6)—were examined. *T. pecorum* was found four times—twice in impala and twice in waterbuck. *T. brucei vel rhodesiense* was found once in a waterbuck and *T. caprae* three times—once in an impala and twice in waterbuck. The conclusions are:—

"1. The trypanosomes found in the wild *G. morsitans* and wild game of the Upper Shiré 'fly area' are identical with those found 100 miles farther north in the Proclaimed area.

"2. The trypanosome causing disease in man in Nyasaland—*T. brucei vel rhodesiense*—is frequently met with, so that it is probable cases of this form of sleeping sickness will be found among the natives of this district."

W. Y.

BRUCE (David), HAMERTON (A. E.), WATSON (D. P.) & Lady BRUCE.
Infectivity of *Glossina morsitans* in Nyasaland during 1912 and 1913.—*Proc. Roy. Soc.* 1914. Aug. 6. Vol. B 88. No. B 600. pp. 43-48.

The object of this paper is to set up a rough standard of the proportion of infected to non-infected tsetse flies in an ordinary fly area where wild game abounds. The flies were collected in the Proclaimed area of Nyasaland.

In 1912 a total of 1,975 flies were dissected between the months of January and November; 129 were found to be infected with trypanosomes, or 6.53 per cent. (males 86 per cent., females 14 per cent.); in 1913, 1,060 flies were dissected, of which 91 were infected—8.58 per cent. Details of the results of dissection of the infected flies are given in tables, as are also results of 60 attempts to determine the infectivity of the fly by injection of the contents of the infected organs into healthy animals. In only three cases did animals become infected, once with *T. simiae* and twice with *T. brucei vel rhodesiense*. In only two cases were the salivary glands found to be infected. This infection was proved to be *T. brucei vel rhodesiense* by injecting the glands into rats. In the 1912 experiments no attempt was made to diagnose directly the species of trypanosomes with which the flies were infected, but in 1913 this was done. Invasion of the salivary glands could only

be *T. brucei vel rhodesiense*; invasion of the intestines, labial cavity and hypopharynx—*T. pecorum* or *T. simiae*, and size would distinguish between the two. Lastly, if only the labial cavity and hypopharynx were seen to contain flagellates, *T. caprae* was indicated—here also the size and character of the trypanosomes in the hypopharynx assisted the diagnosis. No injections of the contents of the organs into healthy animals were made in the 1913 experiments. As a result of the direct diagnosis of 1,060 flies, *T. brucei vel rhodesiense* was found once; *T. pecorum* six times; *T. simiae* 12 times, and *T. caprae* 14 times. The authors write: "It must, however, be confessed that the margin of error in this calculation may be large."

The following is the conclusion:—

"In 1912, 6.53 per cent. of the *G. morsitans* found in the 'Proclaimed' or Sleeping Sickness Area, Nyasaland, were infected with pathogenic trypanosomes; in 1913, 8.58 per cent."

W. Y.

BRUCE (David), HAMERTON (A. E.), WATSON (D. P.) & Lady BRUCE.
Glossina brevipalpis as a Carrier of Trypanosome Disease in Nyasaland.—*Proc. Roy. Soc.* 1914. Aug. 6. Vol. B 88. No. B 600. pp. 20-32. With 1 plate.

Glossina brevipalpis was found in many spots along the west shores of Lake Nyasa. In this paper the authors give (1) a short account of the habits of this tsetse fly; (2) the results of the dissection of the flies; (3) the infectivity of the wild flies; and (4) the results of various transmission experiments.

G. brevipalpis was found in a tract of country forming the delta of the Lingadzi. This tract is broken up by swampy hollows and streams and is covered with palm forest and a dense undergrowth of high grass and bush. The fly is crepuscular in its habits. It only makes its appearance as evening approaches and is not found to follow or settle upon passers-by like other tsetse flies. In the dim light they are difficult to see and resemble little bits of earth on the path, but attention is attracted by the sound of buzzing of the flies if disturbed. The hard trodden surface of the path seems to have an irresistible attraction for them. They do not move about in search of food, but remain motionless for several minutes, and when they move it is only to fly up and immediately settle again in the middle of the path. They were never seen on the roads at dawn. Of the 500 flies caught and examined all were males. It seems to be a habit of the males to frequent the paths in the evening, whilst the females, presumably, hide in the thick jungle. Only four females were found among several hundred *G. brevipalpis* dissected at the laboratory. When kept in captivity the flies remained dormant on the side of their cage during the day; at night they are very active.

If the side of the cage be applied to the skin of a goat or a dog, they will feed with avidity at any time of the day or night. Of 50 wild flies seven contained recognisable blood; this, in six cases, was antelope blood, and in the 7th probably human.

The result of the dissection of 496 wild flies is given in a table—44 were positive and 452 negative. Among the 44 flies which contained flagellates, *T. brucei vel rhodesiense* was found once, *T. pecorum* nine

times, *T. simiae* once, and *T. grayi* eight times. In 10 flies, flagellates were considered to belong to a pathogenic type of unknown species. No opinion can be expressed about the remaining 15. The authors remark on the occurrence of *T. grayi*. They point out that this is common to both *G. brevipalpis* and *G. palpalis*, both of which live near water. It indicates that the vertebrate host of *T. grayi* is probably some water animal such as the crocodile or iguana, or some water bird.

The results of experiments made to test the natural infectivity of *G. brevipalpis* by feeding them on healthy animals are given in the following table:—

TABLE II.—FEEDING WILD *Glossina brevipalpis*.

Date.	No. of flies fed.	Monkey.				Dog.				Goat.			
		<i>T. brucei vel rhodesiense</i> .	<i>T. pecorum</i> .	<i>T. simiae</i> .	<i>T. caprae</i> .	<i>T. brucei vel rhodesiense</i> .	<i>T. pecorum</i> .	<i>T. simiae</i> .	<i>T. caprae</i> .	<i>T. brucei vel rhodesiense</i> .	<i>T. pecorum</i> .	<i>T. simiae</i> .	<i>T. caprae</i> .
1912.													
June 14	42	—	—	—	—	—	—	—	—	—	—	—	—
1913.													
Mar. 18	146	—	—	—	—	—	—	—	—	—	—	—	—
April 29	541	—	+	—	—	—	+	—	—	—	+	—	—
May 7	90	—	—	—	—	—	—	—	—	—	—	—	—
June 25	276	—	—	—	—	—	—	—	—	—	—	—	—
Total ..	1,095												

A series of experiments was undertaken to ascertain if *G. brevipalpis* can act as a carrier of the various pathogenic trypanosomes found in Nyasaland; wild flies were used. In six experiments to transmit *T. brucei vel rhodesiense* 232 wild *G. brevipalpis* were used without any positive results. Only 53 flies were dissected and 8 infected flies found. The results of dissection of the infected flies are given in Table V.

Expt.	Time, Days.	Proboscis.	Alimentary tract.	Salivary glands.
2201	30	—	+	—
2201	37	—	+	—
2213	33	—	+	+
2213	46	+	+	+
2232	37	—	+	—
2232	37	—	+	—
2232	44	—	+	—
2232	44	—	+	—

In Experiment 2201, two infected flies were found. One appeared to be infected with *T. grayi* and the other with a trypanosome of a pathogenic type. One fly was found in Experiment 2213 to have a very heavy infection of the salivary glands and intestines. This fly had failed to infect a dog which it had been fed upon, and injection of the salivary glands and contents of the gut into a white rat was negative. Thus, it would appear that the fly had not yet reached an infective stage. In a plate, the development of the trypanosome causing disease in man in Nyasaland in the salivary gland of this species of tsetse is represented. The long, slender, developmental form of trypanosome found in the gut invades the salivary glands. In this situation the posterior extremity lengthens somewhat and the micro-nucleus and the flagellum pass forward. This appears to be the commencement of the change to the crithidial type, where the micro-nucleus and flagellum lie anterior to the nucleus. In this stage the anterior portion of the parasite has broadened out and the posterior becomes attenuated. In still later stages the attenuated posterior extremity has disappeared and the parasite has become contracted and thickened until it assumes a rounded form and the flagellum is folded on itself. In this encysted form the trypanosomes are found massed together in the lumen of the salivary glands. These forms later unfold, the micro-nucleus is now posterior to the nucleus and the crithidial stage has become trypanosomal. Finally, the typical salivary gland form of the trypanosome is developed. This constitutes a reversion to the blood form, from which the cycle of development began, and is the only infective form. The authors conclude that *G. brevipalpis* is capable of acting as a carrier of *T. brucei vel rhodesiense*.

In three experiments to transmit *T. brucei* of Zululand, 200 wild *G. brevipalpis* were used. One experiment was positive and the other two negative. *G. brevipalpis* is hence capable of acting as a carrier of *T. brucei*, Zululand 1913.

One hundred and thirty wild *G. brevipalpis* were used in two experiments to transmit *T. pecorum*. One was positive and the other negative, from which the authors conclude that *G. brevipalpis* can act as a carrier of *T. pecorum*.

Three experiments were undertaken with wild *G. brevipalpis* to transmit *T. caprae*. One was negative and two positive. On examining the positive experiments they were found to be *T. pecorum* infections and not *T. caprae*. The animals were probably infected by naturally infective *G. brevipalpis*. No infection by *T. caprae* took place, but one of the flies on dissection was shown to have an undoubted development of *T. caprae* in the labial cavity and hypopharynx. From this the authors conclude that *G. brevipalpis* is capable of acting as a carrier of *T. caprae*.

W. Y.

BRUCE (David), HAMERTON (A. E.), WATSON (D. P.) & Lady BRUCE.
Trypanosome Diseases of Domestic Animals in Nyasaland. III.—
Trypanosoma pecorum. Development in *Glossina morsitans*.—
Proc. Roy. Soc. 1914. Aug. 6. Vol. B 88. No. B 600. pp. 33-37.
 With 1 plate.

In this paper an account is given of the development of *T. pecorum*

in *Glossina morsitans*. Seven experiments with laboratory bred flies were carried out with five positive and two negative results. Of the 240 flies used 24 became infected. The first two experiments were carried out at ordinary temperature, whilst in the others the flies were kept in the incubator. Details of the five positive experiments are given in a table. The incubation period of *T. pecorum* in *Glossina morsitans* was found to vary between 19 and 53 days. In the following table the results of dissection of the infected flies found in the positive experiments are given:—

TABLE IV.—LABORATORY-BRED FLIES. POSITIVE EXPERIMENTS.

Expt.	Time days.	Proboscis.	Proventriculus.	Crop.	Fore-gut.	Mid-gut.	Hind-gut.	Salivary glands.
546	30	-	-	-	+	+	+	-
546	64	-	-	-	+	+	+	-
546	84	-	-	-	+	+	+	-
546	84	+	+	+	+	+	+	-
524	27	-	-	-	-	+	+	-
524	55	+	+	-	+	+	+	-
		Labial cavity.	Hypopharynx.					
1737	27	+	+	+	+	+	+	-
1737	28	+	-	-	+	+	+	-
1737	30	+	+	-	+	+	+	-
1853	17	+	+	-	+	+	+	-
1853	22	-	-	-	+	+	+	-
1853	23	+	-	-	+	+	+	-
1853	25	+	+	-	+	+	+	-
1853	26	+	+	-	+	+	+	-
1950	17	-	-	-	+	+	+	-
1950	19	+	+	-	+	+	+	-
1950	24	-	-	-	-	+	-	-
1950	26	+	+	-	+	+	+	-
1950	31	+	+	-	+	+	+	-
1950	31	+	+	-	+	+	+	-

In Experiment 546 only one infective fly was found; in Experiment 524 two infected flies were found. In one of these the development was incomplete, in the other complete. In Experiment 1737 two flies were infective, in 1853, three, and in 1950, four. In no instance was invasion of the salivary glands observed. In another table results of dissection of the four infected flies in the negative experiments are recorded. In none of these had the development of the trypanosomes reached the hypopharynx and consequently none of them were infective. In a coloured plate are depicted the various types of trypanosomes found in the infected flies. The conclusions are:—

"1. That *T. pecorum* is capable of passing through a cycle of development in *G. morsitans*, the flies becoming infective some 20 days after feeding on an infected animal.

"2. That *T. pecorum* belongs to the same group as *T. simiae*, the development taking place at first in the gut and afterwards passing forward into the labial cavity and finally into the hypopharynx.

"3. That the final stage of the development only occurs in the hypopharynx, where the trypanosomes revert to the 'blood form' and become capable of setting up infection if injected under the skin of healthy animals."

BRUCE (David), HAMERTON (A. E.), WATSON (D. P.) & Lady BRUCE. *Trypanosome Diseases of Domestic Animals in Nyasaland. Trypanosoma caprae* (Kleine). Part III.—Development in *Glossina morsitans*.—*Proc. Roy. Soc.* 1914. Aug. 27. Vol. B. 88. No. B 601. pp. 92-96. With 1 plate.

Six experiments were undertaken with the object of transmitting *T. caprae* by *Glossina morsitans*; five of the experiments were positive and one was negative. In all, 170 laboratory-bred flies were used, and 46 infected flies were found (27.1 per cent.). The first three experiments were carried out at laboratory temperature, and in the last three the flies were kept in the incubator. Details of the experiments are given in Table I.

TABLE I.—LABORATORY-BRED FLIES.

Date.	Expt.	No. of flies used.	Experiment positive or negative.	No. of infected flies found.	No. of days before flies became infective.	Mean temperature.
1912						
April 16	444	12	+	1	16	71°F. (22.1°C.)
June 3	617	33	—	0	—	65°F. (18.3°C.)
June 3	1215	22	+	1	21	65°F. (18.3°C.)
1913						
Jan. 18	1777	35	+	11	19	84°F. (28.8°C.)
Jan. 22	1784	35	+	20	19	84°F. (28.8°C.)
April 1	2046	33	+	13	20	84°F. (28.8°C.)

The authors write: "It is difficult to understand the difference in the number of infected flies found. In Experiments 444 and 1215 only 8 and 5 per cent. respectively of the flies became infected, whereas, in the last three experiments, an average of more than 40 per cent. was found. The flies in the second group were kept, it is true, at a temperature similar to that which they would find in summer in the low country, while the first three experiments were done in winter and at the ordinary temperature of the laboratory. This no doubt would explain the difference to some extent. Again, goats and sheep infected with *T. caprae* are unsatisfactory animals to feed flies on. One day the trypanosomes are present in small numbers in the blood, the next day it may be impossible to find any; very seldom are they in any numbers. It is quite possible, then, that flies may feed on an infected goat or sheep without taking in a single trypanosome."

From the five positive experiments it would appear that the average incubation period of 19 days elapses before the cycle of development of *T. caprae* is complete in *Glossina morsitans*.

The results of the dissection of the infected flies are given in a table. It was not, however, until the last experiments that the labial cavity and hypopharynx were examined separately. In the first four experiments the presence or absence of trypanosomes in the proboscis as a whole was noticed. In the first two experiments only a single infected fly was found in each. In the third 11 infected flies were found and in the fourth 20. The number of trypanosomes in the labial cavity varies greatly. Sometimes the lumen of the tube is densely crowded, whilst in others only a single colony of parasites is found. The same applies in the case of the hypopharynx. Excep-

tionally the flagellates may be seen in the oesophagus. This was noted twice among the 46 flies found to be infected. A number of the developmental forms seen in the labial cavity and hypopharynx are depicted in a coloured plate.

The following are the conclusions :—

"1. *Trypanosoma caprae* is capable of passing through a cycle of development in *G. morsitans*, the flies becoming infective some 19 days after feeding on an infected animal.

"2. *Trypanosoma caprae* belongs to the same group as *T. vivax* and *T. uniforme*, the development taking place only in the proboscis.

"3. The final stage of the development takes place in the hypopharynx where the trypanosomes revert to the original 'blood form' and become infective."

W. Y.

NYASALAND PROTECTORATE. Sleeping Sickness Diary. Part xxiii. By the Acting Principal Medical Officer.—10 pp. Zomba: Printed by the Government Printer.

Between January 1st and May 30th of this year 20 cases of sleeping sickness have been found in the Protectorate, 15 in the Dowa district, 4 in the Marimba, and one in Zomba. This brings the total number of cases discovered in Nyasaland up to 192. Details are given of the 20 cases. CONRAN draws attention to an interesting case, that of Mekta, aged six. He writes :—

"This boy's case was diagnosed on the 19th May, 1913, and he is still alive and apparently well. He takes his food well and appears well nourished. He complains of no pains and plays with the other village boys all day. There is no oedema or other physical signs. His temperature is normal. His pulse is somewhat rapid on examination, but this is probably due to excitement. No trypanosomes have been found on the last three occasions when examined. That the original diagnosis was correct is certain because not only have I seen trypanosomes in both smear and fresh blood preparations but a citrated specimen of the blood was used by the Royal Society's Commission for inoculation purposes and a strain of trypanosomes thus obtained."*

With regard to prophylactic measures, the author writes that clearing of the bush around villages is being carried on and a small sum of money has been sanctioned for this purpose. Cases of sleeping sickness have now been discovered over practically the whole "Fly area" of the Protectorate.

W. Y.

NORTHERN RHODESIA. [Report on Sleeping Sickness in Northern Rhodesia.] [KINGHORN (A.), Medical Officer.]—MS. Report received in Colonial Office.

The author examined natives in the Serenje Sleeping Sickness Area, and in a portion of the Petauke District. In the Serenje area, 20 villages were visited and some 1981 natives examined. Two cases of trypanosomiasis were diagnosed; both occurred in Sunda's village,

*This case is perhaps Strain VIII, Mekka, of the Scientific Commission of the Royal Society (see above, p. 339).

which is situated on the Kapamba river, near its junction with the Luangwa. The condition of these two patients at the time of diagnosis was as follows:—

“1. *Mungwali*, aet. 45. Has been sick for 1½ months. Now well-advanced, showing marked oedema of legs, and inability to walk. No glandular enlargement. Trypanosomes present in blood.

“2. *Nondo*, aet. 35. Said to have been ill only one week with headache. Is unable to walk well, shows marked tremors and confused speech. No glands. Trypanosomes present in blood.”

KINGHORN visited 23 villages in the Petauke district and examined 1,483 natives without finding a single case of sleeping sickness. Probably at least 75 per cent. of the total population were palpated.

In conclusion the author writes:—

“The data obtained in this examination would show, therefore, that the incidence of the disease in the Serenje Area is 0·1 per cent., while in the Petauke District it is nil.

“Together, the incidence would be 0·057 per cent. or slightly less than the figure obtained in the examination of the Mpika, Chinsali and Lundazi District last year, viz, 0·08 per cent. The results, I think, need no comment, as only one conclusion is possible, that the disease is showing no tendency whatever to become epidemic.”

W. Y.

PRINCIPE. Reports of the Sleeping Sickness Commission in Principe, December 1913 to March 1914. [Published as a supplement to the “Gazette” of San Thomé and Principe. Translation forwarded to Foreign Office by Consul-General Hall HALL.]

These reports, like those for October and November, 1913 (summarised in this *Bulletin*, Vol. 4, p. 73), show a continued rapid and progressive diminution in the number of *G. palpalis* caught in the plantations in Principe, and a less marked diminution in the number of sleeping sickness cases detected. Probably many of these were old cases which the simpler methods had failed to discover; indeed some had been long suspect. Tables show for each plantation the number of persons examined in each month, the number found infected and how long these had been in the island, and the number of flies caught; the later tables show the number of men employed in this duty. The authors write: One can say that the dreaded transmitter of sleeping sickness has almost disappeared from the island.—Thus in November 1,368 flies were caught; in December 134; in January 19, though 171 persons were employed in catching them; in February 10, and in March 4; in February and March, 1913, the respective numbers were 11,865 and 9,450. The cases of sleeping sickness detected numbered 5, 3 and 5. The patients had resided in the island in some cases as long as 6 and 9 years, and none less than 1 year and 7 months.

An account is given of a visit paid by three members of the Commission to the land worked by the Sociedade de Agricultura Colonial, which is estimated to comprise about half the island and much of which is very favourable for tsetse. In 1908 the percentage of labourers infected was 23·9, in January 1914 it was 8 (total force 1,078). An “elaborate plan of sanitary works” had been carried out between August 1912 and August 1913, “consisting of extensive tree felling, earthworks, and draining of swamps, besides the killing of the swine and flies.” The cost of this was amply compensated by the decrease

of native labourers entering hospital. During four days' search no tsetse could be found and horses were able to graze in safety. It is stated that each group of four brigade labourers carries a "piece of sackcloth" for fly catching in addition to sticky cloths.

As the Consul General remarks, no mention is made of any organised work in connection with land that is either unoccupied or occupied by natives. This is probably due to the insufficiency of staff, of which complaint is made in the reports. [From these and previous reports it is inferred that the great majority of tsetse are trapped by the method devised by MALDONADO (see *Sleeping Sickness Bulletin*, Vol. 2, p. 26). Seeing that this method has not been attended with such great success elsewhere, it would be useful to know the precise nature of the sticky substance used in Principe; it may be that it has a positive attraction for the flies which the substances used elsewhere have not.]

A. G. B.

BOLETIM OFICIAL DO GOVERNO DE PROVINCIA DE S. TOMÉ E PRINCEPE.
—1914. July 15. Suplemento No. 8. pp. 4. *Relatorio da Missao da Doença do Sono referente aos Mezes de Abril, Maio e Junho de 1914.* [Report of the Sleeping Sickness Commission for the three months, April to June 1914.]

The Commission report that during the period under review not a single specimen of *G. palpalis* had been captured on the island, although the numbers of the staff employed on the work had risen from 137 to 197 (Table III). Only one fresh case of sleeping sickness was detected, in the person of one of the fly-catching staff. Probably the infection had occurred some time previously. The number of individuals submitted to examination amounted to 1,345. Although the three months under review are comprised in the dry season, when the prevalence of the fly is at its lowest, the Commission hope that the improvement will be maintained. The proportion of cases of sleeping sickness detected to the number of bloods examined during two successive periods is shown in the following table:—

TABLE I.

Period.	Bloods examined.	Cases detected.	Per cent.
August, 1912–May, 1913 ..	3,992	125	3.13
October, 1913–June, 1914 ..	3,904	19	0.48

The ascertained length of residence on the island of the last 19 cases was as follows:—

TABLE II.

Length of residence	Number.
1–6 months	0
6–12 „	1
1–2 years	1
2–3 „	7
Over 3 „	10
Total	19

Presumably, therefore, the original date of infection was correspondingly remote.

The number of animals whose blood was examined for trypanosomes amounted to 255. Four cases of infection were found, all being in cattle. Three of the animals had been imported comparatively recently, either from the mainland of Africa or the Cape Verde Islands, while the fourth had been on the island for eight years, having also been originally imported. In this case the infection was of an exceedingly mild character, and the trypanosome of a type not previously met with.

TABLE III.

Showing the number of *Glossina* captured in the islands from 1911 to 1914 by the bird-lime process, and the number of the staff employed at the work:—

	1911		1912		1913		1914	
	Insects caught.	No. of staff.	Insects caught.	No. of staff.	Insects caught.	No. of staff.	Insects caught.	No. of staff.
January	17,705	Not given.	29,953	Not given.	21,434	139	19	171
February	14,705		18,025		11,865	139	10	173
March	14,005		12,885		9,450	139	4	173
April	13,705		10,175		6,000	139	1	197
May	14,000		7,907		4,200	139	..	197
June	18,000		9,771		3,158	139	..	197
July	19,001		13,036		2,768	139	..	..
August	10,600		16,301	139	2,934	139	..	..
September	14,175		18,850	139	2,700	139	..	..
October	13,937		15,973	139	2,311	139	..	..
November	23,596		22,450	139	1,368	163	..	..
December	30,200		22,000	139	134	163	..	..
Total	203,629		197,326		68,322		34	

J. B. N.

RINGENBACH. *Tournée Médicale effectuée de Brazzaville à Pointe-Noire (Moyen-Congo et Gabon) en Juin et Juillet 1912.*—*Ann. d'Hyg. et de Méd. Colon.* 1914. Apr.-May-June. Vol. 17. No. 2. pp 361-387.

The object of the tour was to get precise data as to the incidence of human trypanosomiasis in the country west of Brazzaville, between this place and the sea. From this country the Brazzaville market is supplied and most of the labour required by Europeans. It is proposed to make a railway between Loango and Brazzaville which would pass through the district examined. The investigations are described under three headings, the Bakongo District, the Bakougni District and the Gabun District. A diagnosis of sleeping sickness was made when direct examination of the blood or of the gland juice obtained by puncture was positive. It is noted that the natives always denied the existence of sleeping sickness in their villages even when it was quite common.

Bakongo District. The result of the investigations is shown in the table. The biting insects met with are enumerated. It was found that smallpox was widely spread. In one part of the district it was light, causing very few deaths. In another part, however, in a population of twelve villages amounting to 525, there had been 111 deaths, and 257 persons had a severe attack of the disease at the time they were seen. Notes are added on the incidence of yaws, leprosy, syphilis, tuberculosis and lung diseases.

Bakougni District. The incidence of sleeping sickness is shown in the table. One village in this district, Kinanga, was severely attacked.

District.	Examined.			Found Infected.			Total Examined.	Total Infected.	Per-centage.
	M.	W.	C.	M.	W.	C.			
Bakongo ..	661	528	204	4	4	9	1393	17	1.2
Bakougni ..	196	538	330	16	25	13	1064	54	5.07
Gabun ..	150	213	229	13	7	1	592	21	3.5

Of 82 persons examined 16 were infected. The author gives data to show that this was an instance of what the French describe as "house epidemics." The case is mentioned of a native examined at a Catholic mission by ROUBAUD and found infected five years ago; he was now in excellent health, there were no puncturable glands, examination of his blood was negative, and there was no auto-agglutination. He had not had treatment.

Gabun District. The incidence of sleeping sickness is shown in the table. There are notes on the prevalence of other diseases.

Certain measures are recommended for application in these three districts.

A. G. B.

BEHRENS (CHARLES AUGUST). *An Attenuated Culture of Trypanosoma brucei.*—*Jl. of Infectious Diseases.* 1914. July. Vol. 15. No. 1. pp. 24-62.

The author points out that the production of active immunity may be brought about by the injection of living organisms—either fully virulent or attenuated—or dead organisms or their products. The injection of virulent organisms is uncertain and even dangerous; on the other hand, the injection of dead organisms is frequently ineffectual. The introduction of a slightly virulent organism suggests itself as the most suitable for the production of immunity.

Attenuation of an organism may be produced in various ways, such as by treatment with chemical substances, exposure to moderately high temperature or the action of light, by cultivation in immune serum, by passage through relatively insusceptible animals, and finally by long attenuated cultivation outside the body.

Behrens has adopted the last-named method in an attempt to produce an attenuated culture of *T. brucei*, and has, in part, succeeded

The following are the conclusions :—

“*Trypanosoma lewisi* gradually loses its virulence on cultivation, and is practically non-infective in the seventy-fifth generation.

“A dialyzed nutrient agar, plus serum (1 to 2) yields the most constant results in isolation of *Trypanosoma brucei*. The *Trypanosoma brucei* is capable of growing on hemoglobin-free medium.

“The continued cultivation of *Trypanosoma brucei* markedly attenuates the parasite, the latter becoming avirulent, except in few cases, for guinea-pigs and rabbits, and less virulent for rats, mice and dogs. In time, probably a wholly avirulent strain can be obtained.

“A single culture, seven days old, as yet invariably infects the rats, but when kept at room temperature for an additional one, two or three weeks it becomes less infective or not at all. Multiple injections of such aged cultures in some cases produce infection. The non-virulent cultures, twenty-eight days old, are still capable of growth in vitro.

“Cultures induce a subacute or chronic infection, the longest survival in rats being 265 days; in guinea-pigs, 268 days.

“The blood of rats infected with cultures is infective for guinea-pigs after a very long period of incubation, and the guinea-pigs develop marked local lesions, especially about the genitalia. Trypanosomes can be demonstrated in these lesions.

“Consecutive passage of the attenuated strain through rats restores the virulence. This is accomplished more readily when the first passage is made with blood drawn shortly before death.

“The successful production of an attenuated strain opens the possibility of immunising animals against infection with *Trypanosoma brucei*.”

W. Y.

BAYMA (Theodoro). Um Caso de Mixedema Congenito. Apontamentos sobre a Distribuição do “Triatoma” no Estado de S. Paulo. [A Case of Congenital Myxoedema. Remarks on the Distribution of *Triatoma* in the State of San Paulo.]—*Revista Med. de S. Paulo*. 1913. Mar. 31. Vol. 16. No. 6. pp. 103-105. With 1 fig.

A description of a case of congenital myxoedema, with photograph, in a child of five years, of European origin, to show the difference between this condition and that produced by Chagas's disease. The child belonged to a family of Italian immigrants who were suspected by the proprietor of the estate on which they resided of being infected by the latter complaint, a few specimens of *T. megista* having been found in the neighbourhood. At the end of the paper is a list of localities in the State of San Paulo where *T. megista* and *T. infestans* have been found.

J. B. N.

MISCELLANEOUS.

SCHILLING-Torgau (V.). Ueber die feinere Ausarbeitung der Blutmorphologie zur Erhöhung der klinischen Verwendbarkeit und zur Abgrenzung parasitärer Bestandteile auf dem Gebiete der Tropenkrankheiten. [An Elaboration of the Blood Morphology for the purpose of Increasing its Clinical Value and demarcating the Parasitic Constituents in Tropical Diseases.]—*Trans. xvi Intern. Congress of Med.* London, 1913. Sect. xxi. Trop. Med. & Hyg. Pt. 2. pp. 299-307.

This interesting paper is divided up under the following headings :—

1. Improvement of smear technique (*Ausstrichtechnik*).
2. The use of Arneth's formula in the total leucocyte count.
3. The classification of the blood diseases by biological methods.
4. The use of modern cell histology for the blood cells in order to understand their pathological changes.

Under heading (2) Schilling now divides up the neutrophile leucocytes as follows :—

(a) Myelocyten; (b) Jugendliche; (c) Stabkernige; (d) Segmentkernige.

Under heading (3) he classifies anaemia as follows :—

(1) Anaemia with red blood picture (mit/rotem Blutbild) without regeneration: (a) normal or pseudonormal, (b) purely regenerative (Poikilocytosis etc.).

(2) Anaemia with polychromatophilic erythrocyte picture: (a) purely regenerative (polychromatophilia, macrocytes), (b) with degeneration (basophilic points).

(3) Anaemia with normoblastic erythrocyte picture: (a) purely regenerative, (b) with degeneration.

(4) Anaemia with megaloblastic blood picture (megaloblasts and megalocytes).

The paper is a somewhat technical one and should be consulted in the original by those interested. It was accompanied by a lantern demonstration.

In a discussion which followed, Dr. AGRAMONTE of Cuba claimed that the yellow fever parasites described by SEIDELIN were identical with bodies which Schilling showed on the screen in one of his preparations. He stated that the latter's interpretation of their significance was in perfect accord with what was known of the conditions of the blood in health and disease.

G. C. L.

ROEMMELE (A.) & SWEET (Robert). Basophile Patches in the Protoplasm of the Neutrophile Polymorphs.—*Lancet*. 1913. Aug. 9. pp. 384-385. With 1 text fig.

In the blood of a Brazilian sailor admitted into the Royal Infirmary, Glasgow, on November 16th, 1910, certain peculiarities were noted in the neutrophile polymorphonuclear leucocytes. The patient had previously suffered from acute rheumatism. On the day of admission there was a marked leucocytosis (90,600) and some marrow cells were present. In the neutrophiles a basophile patchy appearance

was observed in the protoplasm of many of the cells, the condition giving the appearance of a stage in the evolution of the development of the mature nucleus in the adult cell.

Stained by Jenner's and Giemsa's stains the spots were well seen, as was also the case with toluidin blue. In some cells four or five were seen, in others only one or two. These did not take any particular form, some being peripherally placed while others were attached to the nucleus by fine basophile strands. As the patient got better and the leucocytes returned to normal these appearances were no longer seen. A black and white sketch illustrates the condition.

G. C. L.

FROÉS (João A. G.). **Hemodiagnostico nos Tropicos. (Duas Lições de Clínica Médica).** [Haemodiagnosis of Tropical Diseases.]—pp. iii + 138. Bahia. 1913. Livraria Catilina de Romualdo dos Santos. With 2 figs. and 1 chart.

The importance of blood examinations in tropical diseases is familiar to all. The author in his little work draws attention to this again and furnishes some examples of cases where the diagnosis was made or verified by blood examinations.

G. C. L.

GÓZONY (L.). **Die Abderhaldensche Reaktion bei protozoischer und metazoischer Parasiteninfektion.** [Abderhalden's Reaction in Protozoal and Metazoal Infections.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1914. March 30. Vol. 73. No. 4/5. pp. 345-349.

The author tried Abderhalden's dialysation process in infections with various animal parasites and came to the following conclusions:—

1. With the use of organs (liver and lung) containing numerous trypanosomes, ferments of an apparently specific character could be demonstrated in the serum of trypanosome infected animals. The reaction was a group reaction, i.e. not specific for the various trypanosome species.
2. The reaction appears to be available in fowl spirochaetosis also.
3. In the case of sarcosporidiasis the protozoa were broken up. The reaction was specific.
4. In distomiasis the reaction was not specific. The worms were in some cases broken up by normal serum as well as by the serum from sick animals.
5. Rabbit and rat sera from trichinosed animals broke up muscle tissue, and trichinous muscle to a stronger degree.

Tables with controls are given in support of these statements. It may be noted that serum from a sleeping sickness patient reacted with liver and lung of a *T. brucei* infected rabbit.

[The basis of Abderhalden's reaction is the assumption that, if substances foreign to the blood enter the circulation, other substances (protective ferments) form in the blood which break up and render harmless the foreign substances. The serum to be tested for the presence of a particular ferment is brought into contact with tissue containing the suspected foreign body in a dialyser, and the dialysate is subsequently tested for the presence of peptone or alpha-amino acid. If these are found, it is concluded that the foreign albumin has been dealt with by proteolytic and peptolytic ferments, which have broken it up into peptone and alpha-amino acids. The reaction has been chiefly studied in connexion with the diagnosis of pregnancy, placenta forming the foreign substance.]

A. G. B.

BOOK REVIEW.

GRAHAM-SMITH (G. S.), [M.D.]. *Flies in Relation to Disease. Non-Bloodsucking Flies.* Cambridge Public Health Series. 2nd Edit. xvi + 389 pp. With 32 text figs., 27 plates and 20 charts. 1914. Cambridge: at the University Press. [Price 12/6 net.]

That a second edition of this useful book should be required in less than twelve months from its first appearance will afford as much satisfaction to all who are interested in the sound progress of Medical Entomology as it must to the author himself.

The only feature of the new edition that now calls for notice is an Appendix of 87 pages, illustrated by three plates and sixteen charts, which not only brings the book up to date as a work of guidance and reference, but also records numerous valuable observations and experiments of the author's own.

The investigations of the meteorological conditions that affect in common the increase of flies and the incidence of summer diarrhoea are a model of assiduous and critical research. Among other original records are found some observations of "wild" blowflies, showing that in respect of the dimensions of head, thorax, and wing, no two specimens were in agreement; and some comparative experiments illustrating the effects upon adult blowflies of different kinds of food in the larval stage. The vexed question of the way in which houseflies pass the winter is also considered, the author being inclined to infer, from observed analogy with kindred species, that it is the pupa which hibernates. (Certainly the reviewer has been unsuccessful in his many attempts to get adult houseflies to live through the winter).

Among recent outside contributions to knowledge that are adequately noticed in the Appendix, attention may be invited particularly to GREIG's demonstration of the actual existence of "cholera carriers," quite analogous with "typhoid carriers," and of the fact that such human carriers can accommodate the house-fly as a porter of the cholera vibrio; to the important observations of MITZMAIN, and of PATTON and CRAGG, showing how certain ordinary flies that habitually feed on blood oozing from punctures made by biting-flies may be as dangerous in spreading infection as the biting-flies themselves; to the curious accounts of SURCOUF and others of the transportation of the eggs of *Dermatobia* by mosquitoes; and to BAHR's work in Fiji on the connection between flies and dysentery.

Some attention is paid to the experimental observations of HINDLE and MERRIMAN on the range of flight of the house-fly; but the evidence is not ample enough to establish as a universal proposition the conclusion—which the author seems to endorse—that house-flies tend to travel either directly against the wind or across it. The accounts of FROGGATT and others of the hurt suffered by sheep, particularly in Australia, from invasive maggots of *Calliphora* hatched from eggs deposited not in any wound, but on the wool in parts where it is most apt to be fouled, are also considered at some length. The matter is serious enough for the stockmaster, but surely it is going too far to speak of such an obviously regular declension from the blowfly standard as an impressive and significant change of habit.

There is an amplification of the first paragraph of the author's Preface which, as "preserving from decay the remembrance of what men have done," now satisfies the historic sense.

A. Alcock.

YELLOW FEVER SECTION.

Vol. 3, p. 186. Comment on Dr. SEIDELIN's paper on Vomiting Sickness in Jamaica. "Seidelin's researches do not advance the subject very much." Dr. SEIDELIN writes that he would make no objection to such a statement of a personal opinion, were it not that the abstract leads up to that verdict by omitting entirely any reference to the *Diplococcus jamaicensis* described for the first time in the report. He says also that this was the first time that detailed histological examinations were published.

Vol. 4, p. 153. Summary of AGRAMONTE's paper on "A So-called Parasite of Yellow Fever." Line 5 from end, "two years" should be "a few years." The interval between Dr. Seidelin's illnesses was, in fact, 5 years and 7 months. In the same para., line 4 from top, after "late in the disease" the words "except in one instance" should be inserted. The effect of these slips is to strengthen Agramonte's criticism of Seidelin's bodies as the cause of yellow fever, which was not the intention of the reviewer.

Dr. Seidelin raises objections to other passages in the summary of this paper, but these passages are substantially Dr. Agramonte's.

TROPICAL DISEASES BUREAU.

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[No. 7.

MALARIA.

LEGENDRE (J.). *Le Paludisme à Tananarive.*—*Bull. Soc. Path. Exot.* 1914. Feb. Vol. 7. No. 2. pp. 105-109. With a Map.

Index Endémique du Paludisme et sa Prophylaxie à Tananarive (Madagascar).—*Ann. d'Hyg. et Méd. Colon.* 1914. Apr.-May-June. Vol. 17. No. 2. pp. 531-535.

The malarial endemic index, as shown by a spleen survey in children between seven and fourteen years of age, is high at Tananarive. The unhealthiness of the place is due in large measure to the presence of rice fields in its neighbourhood. These in certain parts are arranged in tiers, one above the other, and so cannot harbour the small cyprinodont fish which are present in the irrigation canals. In their absence the mosquito larvae possess no other enemies.

The author advocates a system of pisciculture, stating that the small fry greedily devour mosquito larvae even when tiny crustaceans are present in abundance. The larger fish, having an alimentary value, should preferably be employed, reservoirs being provided for them where necessary. Another measure recommended is the periodic drying of the rice fields which, if properly carried out, does not damage the crops. The abolition of rice culture in the dangerous zone is not at present attainable.

A. Balfour.

MATHIS (C.) & HEYMANN (P.). *Nouvelles Recherches sur l'Index Endémique du Paludisme au Tonkin.*—*Bull. Soc. Méd. Chirurg. de l'Indochine.* 1914. June. Vol. 5. No. 6. pp. 223-237. With a map.

The authors have sought to establish an endemic index for malaria in Tonkin where all the species of the malarial parasite are present. They have done so by examining stained blood films from 2,458 indigenous children (ages not stated). In their opinion such an haematological index is to be preferred to a splenic index because it is more exact, has a more definite value, and the necessary examination is more easily and quickly carried out.

Tables and a map show the result of their investigations in 1912-14. The latter also shows the results obtained by the enquiry instituted by Mathis and LEGER, in 1909-10. At this time the index figure was 6.6 (232 infections in 3,493 children examined). Now the figure is 6.1 [15.7] (140 infections in 2,458 children examined). Further, it has been found that the endemic malaria is very unequally distributed, not only in the different regions explored but in neighbouring parts of individual localities. This shows the necessity of carrying out careful investigations on a large scale before instituting a general anti-malarial campaign.

A. B.

BAHR (P. H.). *Studies on Malaria in Ceylon. With Special Reference to its Prevention in Agricultural Districts.*—*Parasitology*. 1914. June. Vol. 7. No. 2. pp. 135-156. With 6 plates and 2 maps.

This is to all intents and purposes the same paper which was summarised in this *Bulletin*, Vol. 2, No. 11. There are a few additions as, for example, a list of the Ceylon anophelines collected by Dr. Bahr, while the additional information with which the author furnished the reviewer is now incorporated in the text, and adds to the value of a paper the merits of which have already been extolled.

A. B.

STILES (Ch. Wardell). *Mosquitoes and Malaria. Report on a Short Trip in Eastern North Carolina.*—*U.S. Public Health Rep.* 1914. Sept. 4. Vol. 29. No. 36. pp. 2301-2311.

Professor Stiles, after a mosquito survey of the towns of Kinston, Moorehead City, and Jacksonville in Eastern North Carolina, divides the question into what he calls an internal or intra-urban, and an external or extra-urban problem. He decides that the former is the one which first merits attention, and gives an account of the kind of places in which he found mosquito larvae. Many of these owed their existence to the gross carelessness of householders. Thus, tin cans, paint pots, buckets, bottles, barrels, boxes, kegs, old iron safes or stoves, and boats, were implicated. The mosquitoes found in such breeding places were *Stegomyia fasciata*, now renamed *Aedes calopus* by KNAB of Washington, *Culex pipiens* and *Culex quinquefasciatus*.

In certain instances anopheline larvae were captured, belonging probably either to *A. punctipennis* or *quadrinaculatus*. In the towns drainable standing water had also to be taken into account, and in this connection the author notes what has been observed elsewhere, that rainfall might cause a temporary decrease in the number of mosquitoes, and consequently in the amount of malaria, owing to the rain washing out the pools and carrying the larvae and pupae away to a creek which contained fish.

He discusses the respective responsibilities of the householder and the Municipality in an interesting manner, though naturally this portion of his paper has chiefly a local interest.

The extra-urban problem is a question of dealing with marshes, and is associated with agricultural and economic considerations which Stiles refrains from discussing in detail.

A list of the mosquitoes collected, classified by KNAB according to genera and species and also arranged according to locality and breeding places, concludes the paper. In addition to those mentioned, the mosquitoes found in stagnant water were *Aedes trivittatus*, *Culex restuans*, *C. salinarius*, *C. territans* and *Psorophora (Janthisonia) columbiae*.

A. B.

HYDE (Fritz Carleton) **An Epidemic of Malaria at Greenwich, Conn.**—*Amer. Jl. Trop. Diseases & Prevent. Med.* 1914. Sept. Vol. 2. No. 3. pp. 199-204.

Malaria was present in epidemic form at Greenwich, Connecticut, during 1912, and caused considerable stir, for the town is rich, the home of numerous millionaires, and for a time little or nothing was done to check the disease. Hyde gives a brief description of the town and states that malaria has long been endemic in New Jersey, New York, Connecticut and Rhode Island. So far as Greenwich was concerned the causal mosquito was *Anopheles maculipennis*, which found breeding places in many swamps, ponds, brooks and rivers. The malaria was of a benign type and only assumed the proportions of an epidemic in 1912-13. The author does not explain fully why the fever took on this epidemic form. [Presumably climatic conditions favoured mosquito prevalence, and perhaps the number of possible breeding places had been artificially increased.] Chronic carriers were present in abundance.

Once public opinion had been aroused, the remedial measures taken quickly effected an improvement. They were of the usual type—educational and drainage and levelling operations, together with petulage.

[The paper is not very satisfactory, and is evidently the work of one but little experienced in tropical hygiene. No spleen survey seems to have been made, and the exact species of malarial parasite is not mentioned, though we may infer that it was *P. vivax*. At the same time the preventive measures were apparently conducted with energy and success once they had been instituted. Nothing is said about the administration of quinine, or the screening or systematic treatment of the carrier cases.]

In the discussion which followed BASS mentioned that it is quite possible to have a quick macroscopic agglutination test for *P. falciparum*. Failure to find agglutinin in benign tertian malaria is possibly due to insufficient investigation.

A. B.

VON EZDORF (R. H.). **Malarial Investigations in the United States by the U.S. Public Health Service.**—*Amer. Jl. Trop. Diseases & Prevent. Med.* 1914. June. Vol. 1. No. 12. pp. 855-860.

An outline of the measures being adopted in the United States for the furtherance of an extensive anti-malarial campaign in the southern territories. These are very complete and are classed under the headings, Statistical, Publications, Educational, Surveys (malarial index), Demonstrations and Research. There is nothing new, but any sanitary authority undertaking similar work will find this paper useful.

A. B.

CELLI (A.). *La Malaria in Italia durante il 1912.*—*Ann. d'Igiene Sperimentale*. 1914. Vol. 24. N.S. No. 2. pp. 177-243.

This is Professor Celli's fifteenth annual report on the progress made in combating the scourge of malaria in Italy.

The task of combating malaria in countries situated in temperate climates differs from the problem as met with in the tropics, in that the mosquito season in cool climates is a very short one, so that the major part of the difficulty consists in dealing with chronic and relapsing cases. In a paper by FALCIONI abstracted for this *Bulletin* [Vol. 3, p. 47] it is pointed out that the incidence of malaria in rural districts in Italy often goes up in spring long before the time for the appearance of mosquitoes arrives, the reason being that the resumption of hard work in the fields about the month of April brings out the disease in latent cases. As the Italian hygienist puts it, there is an immense reservoir of old cases of malaria in countries like Italy, from which the mosquito draws his supply of parasites for infecting new ones, and to dry up this reservoir may under certain circumstances be practically more advantageous than to deal with the mosquito directly. There is a great deal that is sound in this argument, which, of course, must be tested by results. The approved method of dealing with the scourge of malaria in Italy is consequently worthy of the attention of those engaged in a similar contest elsewhere, as for example in the tropics, where perhaps the most pressing need is to protect the newly-arrived white man from infection. The assiduous cinchonization of the whole population of malaria districts during the summer, especially of the children who for various reasons are the most liable to infection, is placed in the forefront of the measures adopted for combating the scourge of malaria in Italy by sanitarians, though the continuous treatment of chronic cases is not overlooked. The enormous amount of 22,000 kilogrammes, or about 50,000 pounds of quinine is distributed annually by the State in Italy for this purpose, while the consumption on private account amounts to about 18,000 kilos in addition. The result as regards the reduction in the annual number of deaths from malaria in Italy is indicated in a very striking chart given by Professor Celli on page 191 of his memoir. In this it is shown that, while in the year 1887 there were in round numbers 22,000 deaths from malaria in Italy, the number had sunk in 1912 to only 3,000; and the chart shows that a very large proportion of this decrease only dates from 1902, in which year the distribution of quinine by the State commenced.

There are a great many other interesting points in Professor Celli's memoir, amongst which may be noticed the proposal to try quinetum and other similar amorphous preparations of the cinchona alkaloids in order to reduce expense. The chocolate tablet suggests itself as a very eligible form for administering these otherwise rather unsightly and nauseous preparations of cinchona. As representing a distinct side of the great problem of combating malaria Professor Celli's report merits perusal in its entirety by those who are sufficiently acquainted with the Italian language.

- i. **CELLI (A.).** **La Malaria in Italia durante il 1912.**—*Propaganda Antimalarica.* 1914. June 30. Vol. 7. No. 3. pp. 49-58.
- ii. **CARDAMATIS (J.).** **Comment 'on détruit les Parasites Palustres par la Quinine.**—*Ibid.* pp. 59-61.
- iii. **PARROT (L.).** **L'Enseignement Antipaludique à l'Ecole.**—*Ibid.* pp. 62-64.
- iv. **ROSSI (G.).** **Il Rimboschimento delle Dune nei Riguardi Igienici anche in Rapporto colle Bonifiche Idrauliche.** [The Planting of Sand-dunes in its Hygienic Aspects, and in Relation to Drainage Works.]—*Ibid.* pp. 65-69.
- v. **CAMPBELL (C.).** **Il Rimboschimento delle Dune nei Riguardi Forestali ed Agrari anche in Rapporto colle Bonifiche Idrauliche.** [The Planting of Sand-dunes in its Sylvan and Agricultural Aspects, and in Relation to Drainage Works.]—*Ibid.* pp. 70-78.
- vi. **ROSSI (G.).** **Sulla Dottrina Sanzaro-Malarica.** [On the Mosquito-Malaria Theory.]—*Ibid.* pp. 78-82.
- vii. **DI GIOVINE (Attanasio).** **La Campagna contro la Malaria del 1913 in Lucera.**—*Ibid.* pp. 83-85.

i. The first part of an article reprinted from *Annali d'Igiene Sperimentale* [see above].

ii. A description of the process of disappearance of malarial parasites from the blood under treatment with quinine when studied microscopically. The annular forms and gametes, with the chromatin mass in a state of division, are the last to disappear, and treatment should be continued until they can no longer be found in stained preparations of the blood.

iii. Discusses the instruction to be given to pupils in elementary schools on the subject of malaria.

iv & v. Discuss from different points of view the problem of encouraging the growth of vegetation upon sand-dunes. The result may be to dam up the natural drainage of the land and create marshy pools, which will contribute to the development of malaria. Belts of woodland, under such conditions, should be no wider than necessary, and deciduous trees, like the eucalyptus, the poplar and the cork-oak will be more suitable than conifers from their greater evaporative power, if they can be persuaded to grow. In such localities, where the subsoil is generally cool and moist, the peach will be found to grow well behind the shelter of the timber-belt, and may be expected to give particularly remunerative results.

vi. Is a controversial article in reply to one by SERGI in the number of the same periodical for April 30, 1914.

vii. Is a report on the anti-malarial campaign in 1913 for the district of Lucera in the province of Capitanata. Eighty-three cases of malaria in all came under treatment, of which nearly one-half were in children. There were no deaths. In addition 821 persons were treated prophylactically.

ROSS (Ronald). **Malaria in Cyprus and Greece.**—*Proc. Roy. Soc. Med.* 1914. Mar. Vol 7. No. 5. (Sect. of Epidemiology & State Med.) pp. 107-115.

A paper embodying the remarks made by Sir Ronald Ross when giving a lantern demonstration before the Epidemiological Section of the Royal Society of Medicine. After some preliminary considerations, during which he passed in review the antimalarial work accomplished on the lines he indicates in Hong-Kong, Havana, Ismailia and the Federated Malay States, the author proceeds to discuss the situation in Cyprus and Greece. Cyprus, he says, is an ideal place for mosquito reduction because of the smallness of the rainfall. Rain begins in September and falls fairly heavily up to January, but thereafter it diminishes and from April onwards there is a season of drought. As anophelines require a warm temperature as well as water, and as the rainfall occurs in the cold months, they only begin to breed in March, and are found in river pools, in water from irrigation works and village supplies allowed to run to waste, and in the village wells. They are not found in the large irrigation tanks because the larvivoracious fish get at them readily in these water collections. Ross conducted a spleen survey amongst the children between three or four and fifteen years of age, and in some places found that the "spleen-rate" was 100 per cent. Under 10 per cent. the rate may be considered low. The average worked out at 21 per cent., a very high rate for a European country. The death-rate for the whole island is returned as only 17 per mille, but the statistics are probably unreliable. There is no regular Sanitary Department, but the Medical Department is very active and efficient. An interesting investigation was carried out in London by the author and Majors CHRISTOPHERS and PERRY. They studied the spleen-rates in the heart of London with a view to determining what is really an enlarged spleen. As a result Ross declares that if one can just touch a spleen under the ribs it is probably pathological; at least, if this can be done in over 2 per cent. of the children examined, one may pretty safely conclude that the condition is not normal [see this *Bulletin*, Vol. 3, p. 259].

The breeding places in different parts of Cyprus are described, the formation of a Sanitary Department is advocated, and the necessity for an anti-mosquito campaign, supplemented by quinine therapy in certain parts, enjoined.

As regards Greece, it is shown that malaria occurs in the valleys of that mountainous country. Wherever people can live, *i.e.*, close to water, there malaria thrives with disastrous results. Mention is made of the beneficial results of the work of the anti-malaria league, and the importance of seeing that when quinine is issued it is a pure product and not a powder which is half flour. Both in Cyprus and in Greece the value of training streams is insisted upon. The "fourteen factors" concerned with the malaria question are mentioned, but not fully expounded, though in the discussion which followed the reading of the paper some of them are mentioned.

REGNAULT (Félix). *Du Rôle du Dépeuplement, du Déboisement et de la Malaria dans la Décadence de Certaines Nations.*—*Rev. Scientifique*. 1914. Jan. 10. Vol. 52. No. 2.. (1er sem.) pp. 46-48.

The nations considered are Greece, Italy and Spain. It is in the case of the first two that the dire effects of malaria have been chiefly in evidence. In Spain, Andalusia seems to have been the only part heavily affected. In all three countries the same causes, i.e., devastating wars, ill-advised legislation, dissolute habits, a low birth-rate and great emigration have played a part in bringing about depopulation and decay, but the author insists on the important rôle of deforestation followed inevitably by malaria wherever conditions were suitable for anophelines to live. Ross thought that mosquitoes were probably imported into ancient Greece, possibly from Egypt, but CAWADIAS has shown that malaria was always present. It merely became widespread when the folly of the inhabitants had brought about a state of things favourable to its transmission. Nowadays we are able to safeguard countries against the ruin which befel these territories, the causes of which are briefly reviewed in this interesting historical paper.

A. B.

ABELARDO LARA N. *La Cirugia y el Paludismo.*—*Revista Med. de Yucatan*. 1914. Aug. Vol. 9. No. 10. pp. 217-219.

An account of a case operated on for chronic appendicitis. While under the anaesthetic alarming symptoms of collapse occurred. The patient's temperature was found to have risen markedly, and it was evident that he was suffering from cerebral congestion. Despite the injection of a gramme of quinine and the use of restoratives the patient died.

The author discusses the cause of death and decides that the fact of crescents being found in blood films made a few minutes after death points to the congestion being of malarial origin. He argues that the operation, together with the chloroform, brought about a pernicious attack of comatose type in a patient suffering from latent malaria, the latency being due to previous treatment with quinine. He concludes with the very necessary warning that in the case of patients coming from regions where malaria is endemic no operation should be performed until the blood has been carefully searched for haematozoa.

[This paper raises an important point, and one apt to be forgotten in this country. The reviewer recalls a sad case, in which an apparently strong and healthy patient from the tropics, operated upon successfully for renal calculus, developed malaria and then what was probably a malaric pneumonia, to which he succumbed. Surgeons in temperate climates cannot be too careful when called to operate upon patients from the tropics, in seeing that the latter are not harbouring blood parasites. In some cases, guided by the history, it would be well, even if no malaria parasites are found in the peripheral blood, to prescribe a course of quinine before operating, provided the case is not one of great urgency.]

A. B.

SOUTHERN MEDICAL JOURNAL. 1914. Sept. 1. Vol. 7. No. 9. pp. 687-693. **Surgeon General Gorgas' Report on Malaria and Blackwater Fever in Southern Rhodesia.**

Surgeon-General Gorgas prefaces his report by a letter to the Editor of the above journal, in which he states that he was asked by the English authorities to report on the state of Southern Rhodesia with respect to malaria, which is seriously hampering the development of that country. The letter also contains a few topographical and historical notes. In the report itself, which is the outcome of a visit he made in the company of Major NOBLE and Dr. DARLING, he refers to the fact that countries once intensely malarious have frequently been rendered healthy by settlement and cultivation. As a good example he mentions the regions of the United States now represented by Indiana, Illinois and Michigan, which fifty years ago were notorious for the amount and severity of their malaria. He was told by Dr. FLEMING that the same thing was happening in parts of Southern Rhodesia.

After some general remarks on malaria, and notes on the work accomplished in the Panama Canal Zone, Gorgas turns to the question of blackwater fever, which he is inclined to regard as a phase of malaria. Whatever its cause, however, he points out that the measures taken to prevent malaria will prevent blackwater fever, and hence there is no use waiting till the etiology of the latter is fully worked out. Preventive measures should be taken in hand at once. At the same time, he considers that the Rhodesian Government would do well to establish a laboratory for original research into human diseases generally, and more especially into blackwater fever.

He does not think that the cause of sanitation would be helped by the local government financially assisting recent settlers. He considers that money would be better spent in improving and advancing the campaign of education already begun by Dr. FLEMING. He indicates the lines along which it should proceed and also approves the suggestion that the Government should sell quinine in malarious districts at cost price.

The other measures he advocates are :—

1. Daily prophylactic dose of 5 grains of quinine for settlers and their native servants.
2. Mosquito-proof dwellings.
3. Clearing and draining within two hundred yards of the habitation.
4. The use of a properly constructed mosquito net at night.

He specially urges the municipality of Salisbury to free that town from mosquitoes. As he very truly remarks, it cannot but have a bad effect upon the farmers from malarious districts to find these insects numerous in the capital of the country.

A. B.

Report of Executive Committee of the South African Anti-Malaria Association for the Period ended 30th June, 1913, and Proceedings of the Third Annual Meeting of Members.—18 pp. 1913. Johannesburg: Argus Printing & Publishing Co., Ltd.

Of late years a gratifying amount of activity has been shown as regards an anti-malarial propaganda in South Africa. The South

African Anti-Malarial Association, which has General BOTHA as one of its patrons, has issued a number of useful pamphlets printed both in English and the Taal.* Thus, for purposes of public instruction we have "A Summary of Facts regarding Malaria," by Sir Ronald Ross, for use in schools an illustrated monograph on the Anopheline Mosquito, by R. C. DAUGLISH, and papers dealing with "Fever on the Farm," the foundation and management of local anti-malarial associations, etc. Illustrated cards in English, Dutch, Zulu and the Basuto tongue have also been prepared and issued.

The Report of the Executive Committee of the Association for the period ended June 30th, 1913, has recently appeared. It is noticeable that, despite a comparatively small rainfall, malaria had been more than usually severe in 1913, especially in the Northern Transvaal, due probably to a "flock migration" of anopheline mosquitoes. Where the injunctions of the Association have been carried into effect the disease has been kept at bay.

Larvivorous fish have been tried in certain districts, "Millions" from the West Indies being employed. At Potchefstroom and Zululand they flourished for a brief space and then vanished, having apparently been devoured by natural enemies. These sent to the hatcheries at Stellenbosch did better, but proved susceptible to cold.

The outlook is, however, stated to be encouraging.

[While the Association is to be congratulated on its energy and success, it is disappointing to see that donations and subscriptions for a period of more than one year amounted to less than £300. It is to be hoped that ere long this useful and humane work will receive adequate monetary as well as official support.]

A. B.

HENSON (Graham E.). *The Value of and Necessity for an Early Diagnosis in all Malarial Infections.*—*Southern Med. J.* 1914. Aug. 1. Vol. 7. No. 8. pp. 603-608.

This is an address which, though it contains nothing new, reiterates some of the useful advice which appeared in his recently published book (see Review in this *Bulletin*, Vol. 3, p. 59). He again points out that gametes cannot develop in the blood of man if an original malarial infection is properly treated. He also reminds his audience that the sporozoites and other forms of plasmodia cannot

* FAURE (Jacobus C.). *Mosquitoes and Malaria.*—22 pp. With 13 figs. Reprinted from the Union Agricultural Journal and issued by the South African Anti-Malarial Association. Publication No. 8, 1914. [Also in Taal.]

ROSS (Ronald). *Malarial Fever: How It is Caused and how it may be Prevented.*—8 pp. With 3 figs. Written specially for and issued by the South African Anti-Malarial Association. [Also in Taal.]

How to form and carry on Local Anti-Malarial Associations.—13 pp. With 1 fig. Issued by the Executive Committee of the South African Anti-Malarial Association. 1912.

Boloitse ba Letsiboroma (Malarial Fever). Health Pamphlet (Sechuana) No. 12.—7 pp. The South African (Native & Coloured) Health Society. Issued by the South African Anti-Malarial Association.

HAY (G. G.). *Fever on the Farm. Some Common Causes.*—*Rand Daily Mail* 1914. Mar. 24. [Also in Taal.]

Conquest of Malaria. The Views of Surgeon-General Gorgas. Interviewed by Dr. William Macdonald. Reprint issued by the S. African Anti-Malarial Association. Publication No. 9. [Also in Taal]; and others.

exist in the body of the mosquito when the temperature reaches a level of 60° F. All that he says is very sound, but perhaps the only other portion of the address to which attention should be here directed is that dealing with the best time to make a blood film for diagnostic purposes. Henson states that a good general rule to adopt is to take smears between three and five hours *after* sporulation. The occurrence of sporulation is characterized by the chill, or, in the absence of a chill, by an exacerbation of clinical symptoms.

He cautions against faulty teaching in this respect and discusses the risk resulting from delay in diagnosis, and in the institution of specific treatment by quinine. He holds that in the very large majority of cases a delay of one or two days, during which non-specific symptomatic treatment is employed, will do the patient less harm than the too universal habit of making a diagnosis of malaria in all cases of chills and fever. In this connection he cites the harm that may be done in tuberculosis, appendicitis, endocarditis, septic cholecystitis, pyelitis, and many other conditions which may closely simulate a malarial attack.

[It is much to be desired that all medical men would take an equally stringent view of the necessity of early diagnosis in, and thorough treatment of, malaria. If they would only do so, more than half the battle would undoubtedly be won.]

A. B.

BRAU (P.). De l'Urobilinurie dans les Congestions Hépatiques d'Origine Palustre.—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 596-598.

The author states that he has independently confirmed the work of ATKINSON, of Hong Kong, who in 1913, by the use of Schlesinger's test, demonstrated the presence of urobilin in the urine of malarial patients (see this *Bulletin*, Vol. 2, p. 221). Brau observed that in a series of cases of liver congestion with fever, all of which were supposed to be due to dysentery, and in which the Schlesinger reaction was positive, a certain number did not benefit from treatment with emetin. Although no malarial parasites could be found, there was some increase of the large mononuclears, and the hepatic condition yielded readily to quinine, proving not only that they were cases of paludism, but that the urobilin is of value in these forms of malaria which, owing to the absence of parasites in the peripheral blood, are difficult to diagnose by ordinary methods. [Brau does not seem to have seen the useful paper by ACTON and KNOWLES which was reviewed in Vol. 2 of this *Bulletin*, p. 321.]

A. B.

BARLOW (Nathan). Rheumatic Malarial Fever.—*Amer. Jl. Trop. Diseases & Prevent. Med.* 1914. June. Vol. 1. No. 12. pp. 865-867.

The author, who writes from Honduras, states that he has recently had eight cases under his care which he believes were examples of a rheumatic form of malarial fever. In such cases treatment with alkalies and salicylates is contra-indicated, as these drugs aggravate

the pain, prolong the course of the disease and make the condition more resistant to quinine.

The symptoms are at first those of a neuralgia, or there may be herpes zoster, severe lumbar or sacral pain, or a multiple arthritis. The joints are involved in rapid succession, and there is the same tendency for the infection to jump from one to another that is found in articular rheumatism. The affected joints are not hot or red, and are much less swollen than in rheumatism. The exquisite pain of severe cases of rheumatism is never seen. The swelling is partly within and partly without the joint, is entirely serous in character, and leaves no perceptible changes on subsiding. A simultaneous carditis, or pericarditis, may occur, completing the picture of rheumatism. Each occurred once in this series, but upon recovery the heart and pericardium were clinically normal in each case.

Fever may be very slight or absent. It is rarely as high as in rheumatism, and there is usually not more than one rise in any one day. The profuse sweating of rheumatism does not occur.

Barlow considers that the condition indicates a severe form of malaria and is apt to be followed by malignant complications. Indeed, one of three cases, the clinical history of which he briefly records, developed a violent delirium and died. The treatment consists in pushing quinine to the limit of toleration and continuing it with moderate doses of bromide. A single daily intravenous dose of 15 to 25 grains each of quinine bichloride and sodium bromide in a litre of freshly distilled water should be given for one or two days in all cases of this kind. Aspirin in a single dose of 5 to 8 grains daily may be used to relieve pain. A larger quantity will merely aggravate it. The author insists on the necessity for blood examination in the case of every patient admitted for what is apparently rheumatism.

[Although it is known that malaria is a very protean disease and may simulate almost any complaint, and although this rheumatic type has been already described, the above paper is distinctly useful as serving to keep the medical man on the *qui vive* and teaching him to be on the outlook for aberrant forms of the disease. Further, the notes on treatment are of value, for such cases are very apt to baffle the therapist.]

A. B.

ANNALES D'HYGIÈNE ET DE MÉDECINE COLONIALES. (Clinique d'Outre-Mer.) 1914. Apr.-May-June. Vol. 17. No. 2. pp. 595-597.
Deux Observations de Paludisme avec Hémorragies Rétiniennes
(Hôpital de Tananarive).

These are brief clinical accounts of two cases of malaria in French soldiers due to *P. falciparum*, in which retinal haemorrhages occurred. In the first case the eye condition supervened upon a rapid malaria, anaemia, the second was a neuropapillitis probably due to an oedematous result of a malarial anaemia. Both cases cleared up rapidly under quinine and tonic treatment. Chloride of calcium was also given to one of the patients.

A. B.

ALLIOT. Observation d'Accès Pernicieux à l'Hôpital Colonial de Saint-Louis.—*Ann. d'Hyg. et Méd. Colon.* (Clinique d'Outre-Mer). 1914. Apr.-May-June. Vol. 17. No. 2. pp. 577-579.

A child, four years old, was admitted to hospital suffering from coma and high fever which were diagnosed, apparently without blood examination, as being due to malaria. The father and mother had suffered from paludism, and the brothers and sisters presented signs of tropical anaemia. The child, in addition to being comatose, had conjugate deviation of the eyes, was in a state of collapse, and passed from one convulsion to another, being apparently on the point of death. The treatment, which at first consisted of quinine injections, 0.25 gramme and 0.50 gramme, presumably given intramuscularly, an ice cold bath, ice to the head, an enema and a dose of bromide of potassium and antipyrin, proved efficacious, resulting in complete recovery after a repetition in some measure of the above therapy.

A. B.

BRITTO (Alfredo). Um Caso de Nevrite do Motor-ocular Commun e do Pathetico de Origem Palustre. [A Case of Malarial Neuritis of the Third and Fourth Cranial Nerves].—*Brazil Medico.* 1914. July 22. Vol. 28. No. 28. pp. 269-272.

An account of the case of a young man, 27 years of age, a native of Bahia in Brazil and resident at Periperi, who was found to be suffering from a form of ocular paralysis.

The right eye was affected, there being paralysis of all the muscles except the external rectus, associated with a constant and marked dilatation of the pupil. There was also ptosis of the right eyelid. The author carefully discusses the nature and site of the nerve lesion considering the possibility of damage to the central nuclei, and the question of tumour, gumma, etc. A differential leucocyte count showed a marked increase of large mononuclears, some eosinophilia and a diminution in the polymorphus and lymphocytes. Malarial parasites and pigment-bearing mononuclears were present in the blood. A diagnosis of a malarial neuritis of the third (Motor-oculi) and fourth (Patheticus) cranial nerves was arrived at, and energetic treatment with quinine effected a cure.

A. B.

RUSSELL (R. F.). Malarial Fever with Severe Cerebral Symptoms. [Memoranda].—*Brit. Med. Jl.* 1914. Sept. 12. pp. 470-471.

A negro boy, aged 11, was admitted into an hospital in Jamaica in a comatose state and apparently in a dying condition. His spleen was slightly enlarged and his temperature registered 104° F. Malaria was diagnosed, and under treatment with what the author terms "hypodermic" injections of quinine hydrochloride and the application of ice to the head complete recovery ensued, although on the fourth day after admission and after quinine by the needle and by oral administration, he had frequent epileptiform convulsions, for which he was given sodium bromide and chloral hydrate.

There was, unfortunately, no blood examination made. This detracts from the value of the record, though the case was almost certainly one of malaria. It is stated that 95 per cent. of malaria cases from the district in which the boy lived are of the sub-tertian variety.

A. B.

DEADERICK (William H.). **Herpes Zoster and Malaria.**—*Med. Record* 1914. Sept. 5. Vol. 86. No. 10 [Whole No. 2287]. pp. 421-422.

The author points out that the association between herpes zoster and malaria is well known, and cites several authors who have drawn attention to it. He specially mentions papers by WINFIELD, who reported thirty-three cases of herpes zoster, in eighteen of which malaria was found. He then gives notes of eight cases of herpes zoster observed by himself, five in coloured folk and three in whites. Five of the cases were associated with malaria of the aestivoautumnal type, two of these patients being coloured and three white. Deaderick states that the negro has a relative immunity to simple herpes and many other complications of malaria.

A. B.

COHEN (Solomon Solis). **Note on the Superiority of Intramuscular Injection over Administration by the Mouth in the Treatment of Malarial Infections by Quinin and the Availability of Quinin and Urea Hydrochlorid for this purpose. Technic of the Injections.**—*Amer. Jl. Trop. Dis. & Prevent Med.* 1914. Aug. Vol. 2. No. 2. pp. 124-129.

In a recent note on the value of intramuscular injections of quinine in malaria [see this *Bulletin*, Vol. 4, p. 290] the reviewer took occasion to cite the employment of a similar method of treatment in pneumonia by Dr. Solis COHEN, of Philadelphia. Curiously enough, the latter now publishes a paper strongly advocating intramuscular quinine injections in malaria, affirming the superiority of this method over oral administration, and recommending the use of quinine and urea hydrochloride (quinine-carbamid dichloride) as possessing a greater value than the other salts of the quinine alkaloid. It is not, however, suitable for intravenous use. The author is unable to say whether the greater and prompter activity of the quinine-carbamid compound is the result solely of its ready solubility, or whether some special physico-chemical property is also operative, but he states that there can be no doubt as to its efficiency. It was found by de SCHWEINITZ that, grain for grain, it possesses a greater toxicity than any other preparation of quinine which he tested during his research upon toxic amblyopia.

Cohen quotes statistics to show that, taking the promptness of control of paroxysms and the length of the fever-free period after a single dose as a test of relative efficacy, there can be no doubt that, whatever be the quinine preparation employed, the intramuscular method is immeasurably superior to the oral.

The quinine-carbamid compound can also be given by the mouth, and in ordinary cases of malaria the author's practice is as follows:—

"Either injections are given daily for a week, then weekly for a month, and then fortnightly for another month, or, after three injections, two doses of the quinine and urea compound, of 10 or 15 grains (0.6 to 1 gm.) each, are given daily, by mouth, in capsule—one in the morning, about 15 to 30 minutes before breakfast; and the other 4 to 6 hours later, and likewise when the stomach is empty. As with the injections, the stomachal administration is kept up daily for a week, repeated weekly for a month, and then continued fortnightly for another month.

"After that the patient is advised to take quinine in some form by the mouth, in doses of from 15 to 30 grains, at least once a month for three months more, to have his blood examined monthly, and at the first suspicion of recurrence in any form, to seek medical advice."

One finds that Cohen considers 15 grains a suitable dose for injection. He states that he has not had much experience of pernicious malaria, but he believes that the quinine and urea compound would be very suitable in such cases if given in sufficiently large doses and repeated as frequently as necessary.

He concludes the paper by an account of the technique which he has adopted and which during twenty years' experience he has found to safeguard, so far as he can tell, every point of danger. As so much has recently been written on the supposed drawbacks to intramuscular injections of quinine, we quote it in full:—

"1. The solution is to be prepared extemporaneously, all utensils being thoroughly sterilized in advance, and kept sterile. The quantity of the salt to be employed (ordinarily 15 grains or 1 gm.) is dissolved in a syringe-ful of boiling water. The strength of the solution will thus be from 20 to 60 per cent., according to the size of the dose and the capacity of the available syringe. An optimum strength is 33.3 per cent., but I have used 40, 50, and even 75 per cent. solutions without accident.

"2. The skin is to be cleansed (preferably with tincture of green soap), and an area of about one inch in diameter is to be painted with tincture of iodine or iodine-acetone (10 to 20 per cent.).

"3. A high-pressure syringe, all glass, is preferable. The injection should be made deeply and the needle thoroughly emptied, so that upon its withdrawal retained solution shall not drip upon the punctured skin. As an additional precaution, the iodized skin may be covered with a piece of thin rubber-tissue, stretched taut, through which the puncture is then to be made. This, however, is not commonly necessary.

"4. The point of puncture should be sealed with collodion, or, better, with iodoform-collodion."

A. B.

CLARKE (J. Tertius). **Intramuscular Injections of Quinine.** [Correspondence.] *Jl. Trop. Med. & Hyg.* 1914. Sept. 1. Vol. 17. No. 17. p. 272.

Dr. Clarke, of Perak South, writes a very sensible letter on the above subject. He appeals to clinical experience, pointing to the fact that intramuscular quinine injections, if properly administered, are both safe and efficacious in cases of malaria. So far as the Malay Federal States are concerned, he states that "on some estates the coolies are so convinced of the superiority of the intramuscular method that even though they cannot be persuaded to take the quinine by the mouth they actually ask for the injections." His experience with Europeans is somewhat similar, and local medical opinion is unanimously in favour of intramuscular injections. One of his sentences no doubt expresses the thought of many tropical practitioners at the time, for he says

"Some of us feel that there may be something we do not know on the subject and would like enlightenment."

[Reference to several numbers of this *Bulletin* may help Dr. Clarke and others. The question is discussed briefly in Vol. 4, No. 5, p. 290. The reviewer has reason to think that a forthcoming paper by DEEKS and JAMES of the Panama Canal Zone may throw fresh light on the subject. It will be reviewed in due course.]

A. B.

ROSS (Ronald). **Intramuscular Injections of Quinine.** [Correspondence.] — *Jl. Trop. Med. & Hyg.* 1914. Sept. 15. Vol. 17. No. 18. pp. 286-288.

This letter by Sir Ronald Ross to the Editor of the Journal of Tropical Medicine and Hygiene merits careful attention.

At the outset he refers to the studies of KLEINE, JACOANGELI, MARIANI, MODIGLIANA, GIEMSA, SCHAUAMANN, GAGLIO, SCHMITZ, MEGAW, MacGILCHRIST and others. He refers to the fact that *in vitro* a large amount of quinine is precipitated in the presence of various albumins, especially when the solution of quinine is a strong one. He also points out that experimental work has shown that the absorption of the drug by the alimentary canal is much more rapid and also more complete than when it is given subcutaneously or intramuscularly. He admits that if it is in weak dilution the absorption after injection is better, but this involves the use of large quantities of fluid.

He states further that injections often give rise to considerable local trouble and occasionally to severe local inflammation, and even to tetanus. [As pointed out in this *Bulletin*, Vol. 4, pp. 290-291, there is good reason to think that when such unfortunate sequelae occur they are due to faulty technique and not merely to the quinine, although it is true that sometimes an intramuscular quinine injection, given with every precaution, will leave behind it a slightly painful lump at the site of injection. One would like full information as regards the two cases cited in this connection by Sir Ronald Ross. He does not say what salt of quinine was employed, or in what dilution it was used.]

SANDRO's argument that injection obviates the passage of quinine through the liver is regarded as of no weight, for there is no evidence to show that the drug is destroyed during such passage. Sir Ronald Ross is of opinion that quinine injections are only justifiable in special cases, i.e. where there are gastro-intestinal troubles preventing or delaying absorption, a state of things which he regards as rare, when patients cannot or will not take quinine by the mouth, and possibly for prophylactic use when it is desired to establish a "quinine depot" in the body, so that the drug may be continually fed, as it were, to the blood.

His strongest argument against those who favour the injection method is that they are relying on clinical evidence which has not been tested either scientifically or statistically. He asks for definite proof that injections extirpate the parasite more effectively than administration by the mouth. He indicates how fallacious ordinary clinical evidence may be, and concludes by saying that it is quite possible that some improvement might be made by which the injection method may be rendered more effective and less damaging to the tissues.

[Although one admits the validity of Sir Ronald Ross's main argument, and agrees that the proof for which he asks should be furnished, the fact remains that men are often driven to employ the injection method as the only means of relieving or curing their patients. African experience certainly shows that the gastro-intestinal troubles mentioned by Sir Ronald Ross are *not* rare concomitants. They are specially common in quartan malaria, and when they are present oral administration is very apt to fail. Moreover, it would seem that in serious cases of malaria, even though there is no evident gastro-intestinal upset, the absorptive power of the alimentary canal is greatly lessened or completely in abeyance, while that of the muscles is still effective. One cannot place wholly on one side the vast mass of clinical evidence which shows that intramuscular injection is of undoubted value in pernicious cases. The proof required by Sir Ronald Ross is undoubtedly needed, and should be supplied, but to wait until it is forthcoming before employing quinine injections at all would, in the reviewer's opinion, put back the clock, and in many instances expose malarial patients to an unjustifiable risk.]

One knows that there already exist salts of quinine, such as quinine and urea hydrochloride, or the basic formate (quinoform), which, in the hands of competent clinicians, have yielded excellent results when given by injection. Let the method be improved, but not abandoned pending "scientific and statistical proof." It certainly seems that the wisest course is to employ both methods, as indicated in the reviewer's note in the number of the *Bulletin* already cited, and as advocated by Dr. Solis COHEN in the paper which is summarised in the present issue.]

A. B.

WERNER (H.). *Zur Therapie der Malaria und des Schwarzwasserfiebers*. [The Treatment of Malaria and Blackwater Fever.]—*Beihefte z. Arch. f. Schiffs- u. Tropenhyg.* 1914. June. Vol. 18. Beiheft 5. pp. 171-177. (pp. 327-333).

In this paper Werner deals with such interesting and diverse subjects as quinine-resisting strains of the malarial parasite, so-called pseudo-relapses, combined therapy, the value of Insipin and of the urobilin test, the surgical treatment of the anuria occurring in blackwater fever and the use of salvarsan in cases of this disease.

Hitherto quinine-resistant strains have been found chiefly in cases coming from Brazil, but Werner records their occurrence in German South-west Africa. He recognises an absolute and a relative resistance of the parasites to quinine therapy. In the former neither parasites nor fever disappear even after large doses. The latter is characterised by the return of the parasites to the peripheral blood after the usual prolonged treatment with quinine. The first condition is rare, the second not uncommon.

The author cites the results observed in connection with quinine prophylaxis during the Hottentot campaign of 1904-06. Although carefully carried out it was admittedly a failure. Not infrequently parasites were found in the peripheral blood of men who were not ill and had no fever. Eventually, in many cases, parasites were actually found while the patient was under quinine treatment and true symptoms of resistance to the drug developed.

Werner believes that two factors were operative: (i) An increase of resistance occurring in the warm-blooded host and following the piling in of quinine; (ii) A sustaining of this resistance during the passage of the sexual forms through the mosquito.

He does not think that this resisting capacity is increased during the latter cycle because the quantity of quinine in the insect's stomach must be infinitesimal.

Six cases of pseudo-relapse are mentioned in which there was a rise of temperature without the presence of parasites in the blood. Werner (1910) claims to have been the first to recognise this condition and complains that Ross and Thomson in their paper on the same subject make no mention of his work. In this class of case even salvarsan does not always succeed in preventing a relapse.

As regards combined therapy the simultaneous administration of quinine and salvarsan has been found useful. Even when the dose of each is reduced satisfactory results are obtained. Although methylene blue is toxic to rabbits, and has a comparatively slight specific action on the malaria parasite, it merits further consideration from the standpoint of combined therapy with the object of securing, if possible, the *Therapia sterilisans magna* of EHRLICH. Werner recalls his advocacy of the tasteless and efficient Insipin.* It is now prepared by Böhringer & Sons, Mannheim, in the form of chocolate tablets each containing 0.25 gramme. Six of these constitute the daily dose for benign tertian and tropical infections. Although specially useful in the case of children it may with advantage be given to adults, and is to be preferred to the tannate preparations both as regards tastelessness and the amount of quinine alkaloid present. Analyses have shown that it is excreted in the urine to a marked extent. As a result of observations made on 46 acute and latent cases the value of the urobin and urobilin tests as indicating a cure by quinine is rather discredited. The reaction is often slight, and, moreover, it occurs in beri-beri, enteric fever, gastritis, etc.

ZIEMANN, KRÜGER, KÜLZ AND STANNUS [given as Stannes] have put to the test the author's ideas as to nephrotomy with or without decapsulation in urinary suppression accompanying blackwater fever. The results have not been encouraging, but show that decapsulation alone is not sufficient if the condition of the patient permits operative procedure to be considered.

In two cases Werner has given salvarsan without untoward results to patients in whom, during attacks of tertian malaria, quinine had caused haemoglobinuria.

A. B.

PARROT (L.). *Hydraulique Agricole et Paludisme*.—*Revue Agricole de Bône*. 4 pp.

Owing to the scanty rainfall during the dry season the wine growers on the plains of Bona have recourse to irrigation in order to increase the yield of their vineyards. Parrot, of Algiers, points out that as a result they run the danger of epidemic malaria. He refers to what occurred at Camargue when rice fields were installed there, to the

**Archiv. für Schiffs- und Tropen-Hygiene*. 1912, Vol. 16, Beiheft 1. p. 37.
(C84)

history of Ismailia, and of several other regions where irrigation works have been followed by outbreaks of malaria. As this irrigation is very necessary from an economic standpoint, it is essential that prophylactic measures against malaria be adopted. In the case of the large reservoirs the tanks should be cleared of aquatic plants, and systematic petrolage carried out. It is not necessary to oil the whole of a large water surface as mosquito larvae are not found in the deep central portions of the reservoir. [Curiously enough, nothing is said about the possible value of larvivorous fish in these water collections.] Wherever possible, irrigation canals should be concreted. When this is impossible the banks must be kept clean and all water weed removed.

Where there is only a slight fall, and in the case of the smaller irrigation channels, closed cement tunnels are indicated, reinforced cement being employed to withstand hydraulic pressure. As an alternative the system of double open channels may with advantage be adopted, as employed in Algiers, the channels being used alternatively, each being in use for ten days at a time, and then being run dry. Sump pits should be avoided, or well covered with an hermetically sealed plate of wood or cast iron.

Special care is required in clayey soils, in soils containing clay and silica, and where the subsoil is impermeable. Adequate drainage is then essential, together with proper levelling up of depressed areas and low-lying lands.

[Nothing is said about so-called "weeping soils," *i.e.*, those containing much salt. These are specially troublesome when used to form the banks of irrigation channels raised above ground level. The salt gets dissolved out and leakage inevitably results, the pools thus formed becoming favourite breeding places for mosquitoes.]

A. B.

SERGEANT (Edm.) & BEGUET (M.). *De l'Immunité dans le Paludisme des Oiseaux. Les Pigeons guéris de l'Infection à Haemoproteus columbae ne sont pas immunisés contre elle.*—*Compt. Rend. Soc. Biol.* 1914. June 12. Vol. 77. No. 20. pp. 21-23.

These authors show how the experimental study of Plasmodium and Haemoproteus of birds has had, and probably will continue to have, important relationship with similar organisms producing malaria in man. They recapitulate the history from the time when Ross's researches on bird proteosoma demonstrated the etiology of malaria, note that KOCH and RUGE had shown the possibility of complete cure, and that WASIELEWSKI showed that such complete cure was very rare, an acute attack being usually succeeded by very prolonged chronic infection, which latent chronic infection corresponded to a state of relative immunity. The present workers have already shown (1910) that it is possible to confer this relative immunity without preceding acute infection, by inoculating the birds with old sporozoites. MOLDOVAN found that a canary quite cured of a first attack was acutely infected at re-inoculation, while five canaries which were chronics showed no adverse symptoms when re-infected.

Haemoproteus (Halteridium) used by the present workers also gave a chronic infection to birds. An Algerian greenfinch (*Passer chloris*),

guarded against re-infection, remained infected for four years. For eight years also they have worked on *H. columbae* in pigeons, which became infected either by the bite of *Lynchia* or by inoculation of the crushed bodies of the flies. Details of some of their experiments are given. Cure as a rule was spontaneous, but was rarely as rapid as in one case quoted, where no parasites were seen after two months.

Usually gametocytes of *H. columbae* reappeared two or three summers in succession in the blood of the pigeon. Two Algerian pigeons, kept in perfectly screened cages so that reinfection was impossible, were inoculated in 1906, were completely cured in 1910, and were re-inoculated in 1913, together with normal control pigeons bought in the Paris market. Other Paris pigeons were also kept, but were not inoculated. All the inoculated pigeons showed *Haemoproteus* in their blood after 31 to 38 days, two sets of successive experiments being performed. The authors conclude that an anterior attack of *Haemoproteus* having lasted four years, followed by a period of complete cure of four years' duration, has not conferred immunity on the two pigeons concerned.

H. B. Fantham.

LEGER (André & Marcel). **Sur un Plasmodium de la Roussette du Haut-Sénégal et Niger.**—*Compt. Rend. Soc. Biol.* 1914. July 24. Vol. 77. No. 26. pp. 399-401.

In 37 out of 50 bats (*Epomorphus gambianus*) from the banks of the Niger a *Plasmodium* was found. Gametocytes and schizonts were seen in blood-smears.

The macrogametes possessed much irregularly disposed pigment. When fully grown these forms completely filled the somewhat hypertrophied erythrocytes, which measured 6.5μ to 7μ instead of 5μ to 6μ .

The microgametocytes are more numerous (10 to 1) than the female parasites. Their pigment is in the form of grains, or minute needles, arranged peripherally. It is yellowish brown.

In some bats schizonts were seen in small numbers. These schizonts are either (1) small, annular forms, 2.5μ in diameter, or (2) oval or somewhat amoeboid forms, 4μ to 5μ by 3μ to 4μ . The pigment is in the form of fine, blackish granules. The erythrocytes show no Schüffner nor Maurer's dots and remain normal in size. Adult schizonts, showing nuclear multiplication, were not seen. They may occur, perhaps, in the internal organs.

The authors identify the parasite with *Plasmodium pteropi*, found by BREINL in *Pteropus gouldi* in Australia (see this *Bulletin*. Vol. 2, p. 471).

H. B. F.

MACKIE (F. Percival). **Note on the Parasite of Bat Malaria.**—*Indian Jl. Med. Research.* 1914. July, Vol. 2. No. 1. pp. 375-376. With 1 coloured plate.

The haemamoeboid parasite was found in the Indian fruit bat, *Pteropus edwardsii*. The infection was heavy, but most of the forms were gametocytes, though a few young rings were seen. Microgamete formation or "exflagellation" was observed on diluting infected

blood with normal saline solution. The presence of the parasite "did not seem to affect the host." The infected animal died suddenly, golden yellow pigment being found in its internal organs post-mortem. The invertebrate transmitter is unknown.

56 other bats ("flying foxes") were examined, but no haemamoeboid parasites were seen.

The name *Plasmodium pteropi*, nov. spec., is suggested.

A plate of 9 figures illustrates the parasites found.

[The name *Plasmodium pteropi* is not new. It was first given by BREINL to a parasite found by him in *Pteropus gouldi*, a "flying fox," shot near Townsville, Queensland (see this *Bulletin*, Vol. 2, p. 471). A. and M. LÉGER consider that a malarial parasite found in bats, *Epomorphus gambianus*, in Nigeria is of the same species, *P. pteropi*. From an inspection of the published figures of BREINL and of MACKIE it seems probable that these malarial parasites of the various species of *Pteropus* and of *Epomorphus* belong to *P. pteropi*, Breinl.]

H. B. F.

Erratum.

Vol. 3. No. 3, p. 155. Summary of Dr. MANTEUFEL's paper on Twelve Years' Experience of Anti-malarial Measures (in German East Africa). "All infected persons are dosed with quinine (15 grains every six days for adults)." Dr. A. J. ORENSTEIN points out that there is an error in the bracketed portion of this sentence. The full translation of the text is as follows:—

All adults found infected received daily for four to six days one gram of quinine in a 10 per cent. aqueous solution. Children correspondingly less. Thereafter for two or three months two grams in solution each week on two successive days.

PROTOZOOLOGY.

LAVERAN (A.) & FRANCHINI (G.). **Infections de Mammifères par des Flagellés d'Invertébrés.**—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 605-612. With 4 text figs.

The first portion of this interesting and important memoir contains a short review of the previous researches of the authors (see this *Bulletin*, Vol. 2, p. 463; Vol. 3, pp. 122, 515). In addition there are figures of *Herpetomonas ctenocephali* (non-flagellate and flagellate stages) and of the flagellates of *Anopheles maculipennis*, obtained from Italy. The authors also mention *Crithidia melophagia*, Flu. The parasitic forms seen in the blood of infected vertebrate animals during these various experiments are much the same, whichever flagellate is used. Small parasites are observed in the red blood cells of the infected vertebrates (mostly mice and rats), oval or round in shape, measuring 1.2μ to 2μ by 1μ , or being 1.5μ in diameter respectively. The smallest of these elements possess only a single nucleus; in the larger elements, which are leishmaniform, a blepharoplast is also seen. Anaplasma-like forms are considered by the authors not to be parasitic in nature. In old infections free forms are seen in the blood. These free parasites are rare and are spherical or fusiform and non-flagellate, measuring 4μ to 5μ by 1.5μ .

The infected rats and mice fairly often die, although the parasites never occur in large numbers in them. At autopsy the spleen is found to be enlarged. In smears of the liver, spleen and bone-marrow parasites are observed in variable numbers, chiefly free leishmaniforms. In some liver smears very rare uniflagellate parasites were found, oval or spherical, about 5μ in diameter, having flagella 10μ to 12μ in length. Some division forms were seen. Figures of these various parasites are given.

The second part of the memoir is devoted to new and further observations.

(a) Infection of mice by ingestion of faeces of rat fleas infected with *Herpetomonas pattoni*.—Young white mice were used. Details are given of four experimental animals, all of which became infected. Parasites were seen in the blood three to five days after ingestion of faeces. Three of the experimental animals showed signs of illness. All were killed and parasites were found in the liver in all cases, and sometimes in the spleen and bone-marrow.

(b) Two attempts at infecting dogs with *H. ctenocephali* were negative. An account of a successful experiment on a dog has already been published (see this *Bulletin*, Vol. 3, p. 122). Two monkeys, *Macacus cynomolgus*, were successfully inoculated with *H. pattoni*. One monkey was inoculated intraperitoneally with an emulsion of liver and spleen of an infected mouse. The other monkey was inoculated both subcutaneously and intraperitoneally with similar material. The infection was slight in each case. The second monkey died in about three weeks, free parasites being found in the liver and more rarely in the spleen.

(c) Leishmaniform parasites found in a cutaneous lesion of a mouse infected with *Crithidia fasciculata*.—A white mouse was inoculated with heart blood and liver emulsion of an infected mouse, itself

inoculated from a mouse directly infected with *C. fasciculata*. About six weeks after infection (20th February to 7th April) the mouse showed a hairless area on the nape of the neck and a pimple depressed centrally, the skin being thickened, with a little hyperaemia; there was no crust to the "button." The hairless area extended, the "button" increased in volume and there was a slight discharge. Smears of the superficial discharge showed no Protozoa. Scrapings from the floor of the sore, on the other hand, showed parasites, 1.5μ to 2.5μ by 1μ to 1.6μ , with nucleus and sometimes a blepharoplast. The blepharoplast is rarely bacilliform as in *Leishmania*. A fortnight after the first sore appeared another very small one developed on the left shoulder. In seven days more the neck sore appeared to be healing, and the small shoulder "button" had disappeared. The mouse, which was in good health, was killed. Two mice inoculated from the neck sore remained uninfected. Smears from the sore showed parasites. Heart blood showed very rare parasites; the liver and spleen were negative. The cutaneous lesion of the mouse closely resembled that of oriental sore.

(d) Attempts at culture.—Several trials of infected blood on simplified Novy medium and on Bass's medium have given incomplete results. The parasites have been found in small numbers only, too small to affirm that a culture had been successful.

The results of Laveran and Franchini's experiments "are evidently favourable to the opinions of those authors who think that *Leishmania* and the trypanosomes of vertebrates have arisen from the flagellates of invertebrates." No true trypanosomes were seen in any of the experimental animals.

H. B F.

COLES (Alfred C.). **Blood Parasites found in Mammals, Birds and Fishes in England.**—*Parasitology*. 1914. May. Vol. 7. No. 1. pp. 17-61. With 4 plates.

The paper contains notes on many parasites found in the blood of animals in the neighbourhood of Bournemouth.

Trypanosomes, both mature and immature, were found in three out of twenty bats, *Vesperugo pipistrellus*. *Achromaticus vesperuginis* was also present in some of the bats. A spirochaete (*S. vesperuginis* sp. n?) was found in the bats' blood. Haemamoebae also occurred in bats.

Trypanosoma talpae was seen in five moles out of eighteen examined. Both small and long forms were seen. The long forms bear the same relation to *T. talpae* as *T. longicaudense* does to *T. lewisi*. *T. lewisi* occurred in rats, the number infected varying with the locality. Pulmonary cysts, *Pneumocystis carinii*, were found in one rat. *Trypanosoma cuniculi* in small numbers was examined in a few rabbits. Measurements are given. A cow suffering from redwater fever also contained a very large trypanosome, 98μ long. Trypanosomes were found in the blood of the blackbird, thrush and jay, and were also observed in various fish. Every eel examined contained them (*T. granulorum*) and the parasites were often exceedingly numerous. *T. percae* from perch, *T. remaki* from the pike, *T. leucisci* from the roach, all were found. Haemogregarines were also seen in the blood

of the sole, flounder, dogfish, skate and weever (*Trachinus vipera*). A probable new species of haemogregarine, *H. microti*, was detected in the blood of the field vole, while *H. muris* occurred in rats. The field mouse, *Mus sylvaticus*, also harboured *H. sylvatici* n. sp. A new piroplasm, *Nuttallia muris*, is also described from the blood of mice, and another, *N. microti*, from the water vole. *Piroplasma divergens* was obtained from a cow. Halteridia were present in many birds, especially the thrush, blackbird, starling, jay, finch. Parasites were very numerous in young birds, slight infection occurring in older ones. In blackbirds and thrushes heavy infections with Leucocytozoa occurred; flagellation was observed in fresh preparations and on stained films. Forms probably representing schizogony of the leucocytozoon occurred in the lung smears of one thrush. Grahamella and Elleipsisoma were found in moles, the former also in rats, voles and field mice. Microfilariae were detected in bats and birds, and a Bodo, or Monas was present in the heart blood of a lizard. A short account is also given of the Toxoplasma and Haemogregarine of the squirrel, both apparently being new species, *Tox. sciuri* and *H. sciuri*, respectively. The various parasites are illustrated by photomicrographs.

H. B. F.

MINE (N.). Beiträge zur Kenntnis der Blutparasiten der Vögel in Japan.

[Blood Parasites of Birds in Japan.]—*Arch. f. Protistenkunde*.

1914. May 14. Vol. 34. No. 2. pp. 198-211. With 2 plates.

An account is given of the protozoa observed by the author in the blood of birds at Kanazawa, Japan. The hosts were sparrows (*Passer montanus*) and crows (*Corvus macrorhynchus japonensis*), and Haemoproteus, Leucocytozoa, Trypanosomes and Proteosoma were studied. While Proteosoma was uncommon in the sparrows, Leucocytozoa were often abundant. A new form of haemosporidian found in the large endothelial cells and macrophages of the spleen, lungs and bone-marrow of sparrows was discovered, its form [according to the author] being suggestive of *Leishmania donovani*.

Haemoproteus (Halteridia) were common in the blood of sparrows in summer. The author considers that he has observed male, female and indifferent forms, and that transitional forms to freely motile trypanosomes were present. Transitional forms only occurred when many young schizonts were present. Macrogametocytes propagate parthenogenetically. In the spleen gregarine-like and trypanosome-like forms were seen. The author considers that the parasite is the *Halteridium noctuae* of Schaudinn.

A new species of halteridium from the crow is described. It is considered to be new, as it is said to be binucleate, possesses alkaliophile granules, occurs near the nucleus of the erythrocyte, may be in pairs within the erythrocyte, has a large principal nucleus and presents other nuclear differences. Male, female and indifferent forms also were seen. Indifferent forms multiply rarely. The various forms are described. Apart from the very large nucleus, the features are of the ordinary type. A trypanosome, of the type *Trypanosoma avium majus*, occurred in the same crow as the new halteridium.

Proteosoma occurred in sparrows. Stages from the youngest schizonts to gametocytes were followed. The author considers that he has found male and female schizonts in the internal organs. Also he thinks binuclearity is present and that the youngest parasites have a short flagellum. The schizogony occurred in the spleen and bone-marrow and also in the peripheral blood. In the spleen and bone-marrow, free, spherical schizonts were seen. As many as 12 nuclear divisions may occur. Male and female merozoites result. There are also small merozoites, which may not have originated from the above described schizogony. Male and female forms differ in staining reactions. They are 2μ to 3μ long and 0.3μ to 0.5μ broad.

A new kind of Haemosporidian was found in preparations of the spleen of the sparrow. The parasites showed "kala-azar-like stages." In summer they often occurred in the protoplasm of leucocytes. Often two to ten parasites were in one cell, occasionally masses of 100 to 200 were present in a single host cell. At the height of infection, many tiny wedge-shaped forms were seen. The protoplasm of intracellular forms "cannot be distinguished." Both they and young free forms seem to be composed of nuclear material. [This interesting parasite deserves further investigation. Is it not a Toxoplasma?] H. B. F.

LEGER (Marcel & André). *Trypanosomes et Haemoproteus d'Oiseaux du Haut-Sénégal et Niger.*—*Bull. Soc. Path. Exot.* 1914. June. Vol. 7. No. 6. pp. 493-497.

The paper contains an account of a number of trypanosomes found by the authors in birds from the neighbourhood of Bamako. A table of certain characteristics of various Haemoproteus of birds also is given.

The trypanosome of *Ardea atricapilla* seems identical with *T. calmetti*, described by MATHIS and LÉGER from the domestic fowl. The trypanosome of *Francolinus bicalcaratus* is quite distinct from that described by KERANDEL in the same bird in the Congo. The length is only 38μ without flagellum, instead of about 60μ . The blepharoplast is very small. *Glaucidium perlatus* has a massive trypanosome with finely vacuolated cytoplasm; the nucleus is perpendicular to the long axis of the body. The membrane has three or four large undulations. A trypanosome in *Lanius auriculatus* has its protoplasm striated longitudinally [myonemes], especially the part in front of the nucleus. A vacuole anterior to the blepharoplast seems constant. *Nectarina platyura* contains a trypanosome with a voluminous nucleus; that of *Vidua principalis* also has well marked longitudinal striations. The trypanosome of *Hyphantornis cucullatus* has no free flagellum. *Trypanosoma lagonostictae* has also been seen in a *Lagonosticta minima*, having been found previously by MARULLAZ in *L. senegala*. The last trypanosome described is from *Cynnirris chloropygia*, 27μ long by 6μ broad, and no free flagellum has been seen. A table of dimensions of the various trypanosomes is also given.

H. B. F.

WOODCOCK (H. M.). **Studies on Avian Haemoprotozoa: No. III.—Observations on the Development of *Trypanosoma noctuae* (of the Little Owl) in *Culex pipiens*; with Remarks on the Other Parasites occurring.**—*Quarterly Jl. Microsc. Sci.* 1914. Sept. Vol. 60. Pt. 3. pp. 399-433. With 3 plates and 1 text fig.

The author concludes the account of his researches on the parasites of the little owl (*Athene noctua*) carried out at Rovigno in 1909. The organisms described are *Trypanosoma noctuae*, the ookinetes of *Halteridium noctuae* and *Leucocytozoon ziemanni*, and certain "resting flagellates." The stages in the invertebrate host, *Culex pipiens*, are especially dealt with.

Regarding *T. noctuae* the author describes and figures crithidial forms, early trypaniform parasites and types approximating to the final inoculative stages as seen in the mosquito. He considers the inoculative forms to be attenuated, thread-like trypanosomes with ladder-like nucleus, and they are depicted in five figures. They occur in the stomach and are probably inoculated again into the blood of a vertebrate at the second time of the mosquito's feeding. Stumpy, gregariniform, but still flagellate parasites, serving for attachment and coincident multiplication, are also figured; they occur in the anterior end of the stomach and in the invaginated epithelium of the proventriculus.

The author concludes that "the three parasites of the little owl—*Trypanosoma noctuae*, *Halteridium noctuae* and *Leucocytozoon ziemanni*—are entirely distinct and separate types."

The development of the *Halteridium* and the *Leucocytozoon* beyond the ookinete stages, which are figured, remains to be ascertained.

The "resting flagellates" were found in "wild" mosquitoes. There are five figures of them.

The last plate contains a "scheme comparing the development of *T. noctuae* in the mosquito with the developmental stages of *T. fringillarum* [of the chaffinch] as found in cultures."

H. B. F.

LEGER (Marcel & André). **Hématozoaires des Reptiles du Haut-Sénégal-Niger.**—*Bull. Soc. Path. Exot.* 1914. June. Vol. 7. No. 6. pp. 488-493. With 6 text figs.

During the French scientific mission to Senegal, Haut-Sénégal-Niger, the military territories of Chad, Dahomey, Ivory Coast and Guinea, BOUET collected haematozoa of reptiles, and blood-smears of various saurians, chelonians and ophidians have been sent to the authors. The haemogregarines of *Varanus* and of a crocodile are now described.

Two types of haemogregarines were found in *Varanus niloticus*. In two of the three *Varanus* the parasite was a curved vermicule, 12μ to 14μ long by 2.5μ broad, with a nucleus extending two-thirds of the length of the body and about half its breadth. No cyst wall was seen. Young forms were 2μ to 3μ . The second type was always larger, 10μ to 12μ by 4.5μ to 5μ . The nucleus was fairly compact, with bands of chromatin extending across it. In each case, the volume of the host-cell was normal and there was no tendency to karyolysis. The two types never occurred in the same animal. The second haemogregarine is identified with *H. varani* Laveran.

Crocodilus niloticus has both free and endoglobular haemogregarines. The endoglobular forms are in various positions in the non-hypertrophied but deformed host cells. The mature form, surrounded by a cyst wall, measures 12μ to 14μ . Chromidia occur near the nucleus. Free forms are 18μ to 21μ long with a maximum breadth of 2.5μ .

In a lizard, common on the Niger banks, having an orange under surface, the authors found a trypanosome in the blood which they regard as a variety of *T. boueti*. A spitting serpent, *Sepedon haemachotes*, contained *Plasmodium mesnili* Bouet. Macro- and microgametocytes, 18μ to 20μ by 9μ to 12μ were found within hypertrophied erythrocytes, the deep staining macrogametocytes, with their voluminous pigment, being distinguished easily from the microgametocytes.

H. B. F.

LEGER (Marcel & André). **Hémogrégarine et Trypanosome d'un Poisson du Niger, *Tilapia lata*.**—*Compt. Rend. Soc. Biol.* 1914. June 26. Vol. 77. No. 22. pp. 183-185.

The authors have examined some thirty *Tilapia lata*, a fish found in the Niger, at Bamako. They found haemogregarines and a trypanosome in the blood. The haemogregarine was always endoglobular. Small forms were vermicular, 2μ to 3μ by 1μ to 1.5μ . The host cells were not hypertrophied, nor their nuclei displaced. Large vermicular forms 9μ to 10μ long and 2μ to 2.5μ broad were often curved. The red cell containing the parasites seemed to become rounded without hypertrophy. Large ovoid parasites, 8μ to 9μ by 5μ also were present. The host cell was not dehaemoglobinated, it was deformed and its nucleus while intact was displaced to one side. No multiplicative forms have been found in the blood. The large vermicules and large ovoid forms are, in the opinion of the authors, sexual elements, and the proportion of the sexes is ten male to one female. The parasite is named *Haemogregarina tilapiae*.

The trypanosome of *Tilapia lata* is not described but a table of its dimensions is given. Its total length is 50μ , the free flagellum being 10μ , and the maximum breadth is 4μ .

H. B. F.

VISENTINI (Arrigo). **Ricerche sopra taluni Microparassiti della Talpa e sulla Alterazioni Istopatologiche da essi Prodotte.** (Seconda Nota preventiva.) [Some Microparasites of the Mole.]—*Boll. Soc. Med. Chirurgica di Pavia.* 1914. No. 1. 12 pp. With 1 plate.

The author refers briefly to his former paper (see this *Bulletin*, Vol. 3, p. 121) and then gives an account of a Sporozoon he has found in the mole, *Talpa europaea*, which he considers to be a new Coccidium. He mentions that he thinks that the Haemogregarines should be considered as true Coccidia.

The new parasites were found in the spleen and especially in the liver of the host. Rounded cysts, measuring 22μ to 33μ in maximum diameter, occurred in the epithelium of the hepatic canaliculi and bile ducts. The invaded cells at first showed hypertrophy and nuclear degeneration and then atrophy. Necrotic foci in the liver were visible macroscopically. The connective tissue also showed inflammatory changes.

Two forms of the parasite, macrogametocytes and microgametocytes, were observed. Details of their morphology are described. Figures of these forms, together with one representing possible fertilisation are given. Cysts containing macrogametes and microgametes were seen, as well as structures that might represent oocysts.

On searching the literature, the only organism corresponding to the one Visentini has described was the parasite of the mouse described by CARAZZI, which he interpreted as oocysts of *Eimeria stiedae*, a common parasite of the rabbit. The author concludes by suggesting that, if his mole parasite is really a stage in the development of a *Coccidium*, another stage of the vital cycle may occur in the circulating blood.

H. B. F.

LEGER (Marcel & André). i. **Les Leucocytozoon : leur Dénombrement et Essai de Classification.**—*Bull. Soc. Path. Exot.* 1914. May. Vol. 7. No. 5. pp. 437-447.

LAVERAN (A.). ii. **Sur les Leucocytozoon.**—*Ibid.* June. No. 6. pp. 461-462.

LEGER (M.). iii. **Sur les Leucocytozoon.**—*Ibid.* July. No. 7. pp. 549-550.

i. The authors give a useful list of the known Leucocytozoa of birds. There are over 120 entries of Leucocytozoa found in various avian hosts, the latter being arranged according to GADOW and EVANS'S classification. The parasites are divided according as the host cell is either (1) fusiform, with the ends drawn out, or (2) rounded. Each division is further subdivided according as the nucleus of the host cell is either slightly or greatly deformed by the action of the parasite. The authors consider that the fusiform host cells are erythroblasts, altered and hypertrophied [but they do not clearly establish their view.] They consider that the rounded host-cells are mononuclear leucocytes. They point out the insufficiency of a classification based on the specificity of the avian host, for the same species of bird may be parasitised by two kinds of Leucocytozoa, one in rounded cells and another in fusiform host cells. Finally, the authors point out that their classification is provisional. They state that it will give place to a more rational one when the "secret of schizogony has been penetrated" and when the life-cycles in the probable invertebrate hosts are known. [But schizogony is already known to occur in the internal organs of the vertebrate hosts in at least two cases, namely, that of *L. levati* in the spleen of the grouse as found by FANTHAM (1910) and of *L. ziemanni* in owls by MOLDOVAN (1913), see this *Bulletin*, Vol. 2, pp. 265, 466.]

ii. Laveran points out that as regards the Leucocytozoon, *L. ziemanni*, of *Athene noctua*, the species name was not given by LÜHE in 1906, as stated by A. and M. Léger, but by himself in 1902, when Laveran named the organism *Haemamoeba ziemanni*. Laveran also maintains that certain of these organisms (e.g., *Haemamoeba majoris*) contain black pigment granules. Finally, Laveran points out again that endocellular haematozoa should be classified according to their morphological and evolutionary characters, and not according to the modifications which they produce in the host cells.

iii. M. Léger apologises for the error in ascribing the name *L. ziemanni* to LÜHE instead of LAVERAN. No doubt is cast on the pigmented character of the Leucocytozoon of *Parus major*. It is acknowledged that the proposed classification of A. and M. Léger is based upon physiological and not morphological characters. It is provisional only, and may be useful, as it recognises characters easy of control.

H. B. F.

LEGER (André & Marcel). **Leucocytozoon d'Oiseaux du Haut-Sénégal et Niger.**—*Bull. Soc. Path. Exot.* 1914. May. Vol. 7. No. 5. pp. 391–395.

Leucocytozoa were found in the following birds of Haut-Sénégal et Niger:—*Ardea atricapilla* in rounded mononuclear leucocytes; in *Turtur senegalensis* in rounded cells; in *Centropus monachus* in rounded cells; in *Corvinella corvina* in rounded mononuclear leucocytes; in *Hyphantornis cucullatus*; in *Pyromelaena flammiceps* in rounded cells; in *Prionops plumatus*; in *Pycnonotus barbatus* in rounded cells; in *Numida meleagris*; in *Francolinus bicalcaratus*, in both fusiform and rounded cells; in *Bubo lacteus* in markedly fusiform cells; and in *Coracias abyssinicus* in deformed fusiform cells, seemingly rounded.

H. B. F.

MOLDOVAN (J.). **Untersuchungen über den Zeugungskreis des Leucocytozoon ziemanni (Laveran).**—*Arch. f. Protistenkunde.* 1914. June 17. Vol. 34. No. 3. pp. 249–262. With 2 coloured plates.

The author gives an account of his researches on the Leucocytozoon and trypanosome of the stone-owl, and apparently considers that his work shows a genetic relation between the organisms, as was stated by SCHAUDINN in 1904. In acute infections active schizogony of *L. ziemanni* occurred, there being a six days' periodicity. The acute stage was only found in July and August, and the schizonts diminished in numbers about the middle of August. With chronic infections the schizonts occurred sparsely in the peripheral blood. Gametocytes in their youngest stages are not different from schizonts, but gradually assume the characteristic forms. Division stages of gametes and double infections of the host cells with gametocytes were not seen. Male and female leucocytozoa were observed from April to October.

By cultures on Novy and MacNeal's medium the author states that characteristic oökinetes arise from the fertilised macrogametes, which can further develop as flagellates. Two plates of coloured figures [but open to various interpretations] illustrate the paper.

H. B. F.

PHISALIX (Marie). **Sur une Hémogrégarine Nouvelle, Parasite de Boodon fuliginosus Boë, et ses Formes de Multiplication Endogène.**—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 575–577.

In an African adder, *Boodon fuliginosus*, sent from the Sudan, which died one month after it was received [in Paris ?] the author

found a new haemogregarine. The ectoparasites on the snake were *Ophionyssus natricis* (a Gamasid mite) and *Aponema laeve* (an Ixodid tick). Nematodes were found in the oesophagus and perivisceral connective tissue. There was marked anaemia and some loss of haemoglobin in the remaining erythrocytes of the reptile.

Endocorpuscular parasites were of two kinds:—(a) vermicular, 14μ to 15μ by 2μ to 3μ and (b) broader forms, fewer in number, reaching 7μ in breadth. Free parasites presented similar appearances.

In the lungs, liver, spleen and kidneys ellipsoidal cysts, measuring 17.5μ to 30μ by 12.5μ to 20μ were found. They contained macromerozoites, two to four, or rarely six, in number. Other cysts, 25μ to 30μ by 18μ to 25μ , were seen in the lungs, liver and pancreas, in which micromerozoites were in process of formation.

The parasite is named *Haemogregarina boodoni*.

H. B. F.

DUCCESCHI (V.). **Note di Parassitologia comparata del Sangue.**—*Annali d'Igiene Sperimentale*. 1914. Vol. 24 (Nuova Serie). No. 2. pp. 269–273. With 1 coloured plate.

In this paper two haemogregarines are described and figured. The first is *Lankesterella leptodactyli*, a small parasite occurring in the blood of the South American frog, *Leptodactylus ocellatus*. Endocorpuscular and free forms were seen. The invertebrate transmitter is perhaps a larval Hydrachnid.

The second parasite is *Haemogregarina iguanæ* found in the blood of two iguanas (*Tupinambis teguixin*). The parasite does not multiply in the blood, and search for multiplicative stages in the internal organs of the host has so far been negative.

H. B. F.

CRAWLEY (Howard). i. **Two new Sarcosporidia.**—*Proc. Acad. Nat. Sciences Philadelphia*. 1914. Mar. pp. 214–218. With 1 text fig.

ii. **The Evolution of *Sarcocystis muris* in the Intestinal Cells of the Mouse** (Preliminary Note).—*Ibid.* May. pp. 432–436. With 1 plate.

i. The first of the new Sarcosporidia, *Sarcocystis leporum*, n. sp. was found in the “arm and shoulder of a very old male rabbit shot at Bowie, Md. [Maryland], on December 13th, 1913.” “In the fresh tissue the parasitic cysts were visible as short, delicate threads or rods lying in the muscles. They were about 2 millimeters long, and the diameter measured in paraffin sections was from 200 to 250 microns.” The infection, however, was very slight. Within the sarcocysts were the usual compartments or chambers containing spores, a small central area being empty. The banana-shaped spores, as seen in smears, averaged 13μ by 5μ . One end, the anterior, was the more pointed and contained homogeneous faintly staining cytoplasm. The nucleus was usually near the posterior end. The median portion of the spore was deeply staining and alveolar. The author considers the anterior

clear portion of the spore analogous with a rostrum. According to his hypothesis, this anterior area may be used later to bore a way into the intestinal epithelium of a new host. There is a text figure representing three spores.

The second parasite is called *Sarcocystis setophagae*, n. sp. having been found in 1895 in the muscles of a redstart (*Setophaga ruticilla*). The sarcocysts averaged 2.5 mm. by 1 mm. The spores were small, 4μ to 5μ by 0.75μ to 1μ . They resembled the spores of *S. rileyi* of the duck.

ii. The author disagrees with ERDMANN'S researches (1910) as "the [Sarcosporidian] spore when in the lumen of the intestine of the mouse does not set free an amoebula, since it is itself a naked mass of protoplasm." Crawley states that "the spore, when in the intestine of the mouse, becomes endowed with the ability to display very energetic twisting and boring movements, by virtue of which it forces its way into a cylinder cell of the intestinal epithelium, and there comes to rest. This takes place within $2\frac{1}{2}$ hours after the infecting feed, and possibly much earlier."

Some of the spores of *Sarcocystis muris* when swallowed by a mouse become "oval bodies, generally about half as long as the typical spore." Their nucleus is vesicular and the cytoplasm "consists of a dense spongioplasm." Such spores are figured as occurring in the cylinder cells of the host 2 to $2\frac{1}{2}$ hours after feeding. Similar spores occur also in the lumen of the gut at the same time. The intracellular parasites then undergo gradual diminution of the cytoplasm but show increase in size and complexity of the nucleus—characteristic of the period about six hours after feeding. A little later, nine hours after feeding, the parasite "is characterized by a great variety of conditions, of which the majority are difficult to interpret." Crawley considers that the parasites are separating into two categories, reaching their full culmination at the end of 18 hours. He interprets this differentiation as that of male and female forms.

Male elements "apparently consist of only the nucleus of the original spore." They "show a karyosome and a nuclear net which here and there supports little aggregates of chromatin." Finally these become multinucleate and form "microgametes." The microgametes are 2 to 2.5μ long, with one end broader than the other. These reach their full development at the end of 18 hours and are no longer present at the end of 24 hours. Some of the male elements lose their cytoplasm as early as three hours after the host's infected feed.

The females "can only be picked out with any certainty" in their later developmental phases. According to the author's hypothesis and interpretations the females appear to "retain most if not all of their cytoplasm." Also, "in the periods from 9 to 18 hours parasites which are clearly females show phenomena which suggest maturation." In the early stages, about 9 hours after feeding the host, the females are "oval elements containing a vesicle in which is a chromatin body." Finally, the author figures a condition which suggests fertilization of a macrogamete by a microgamete.

The plate contains 12 figures showing all the main points of the author's views.

ERDMANN (Rh.). **The Schizogony in the Life Cycle of *Sarcocystis muris*.**
—*Proc. Soc. Exper. Biol. & Med.* 1914. May 20. Vol. 11. No. 5.
pp. 152-153.

The author had described in 1910 certain large amoeboid forms of *Sarcocystis muris* found in the walls of the intestine and in the lymph vessels of experimentally infected mice. Further investigations, briefly summarised in this note, record "the appearance of small amoeboid and schizogony forms six days after infection. These stages were discovered after feeding sarcosporidia to young mice nourished with milk from birth to the end of the experiments. These small schizogony forms (0.3μ to 0.4μ) consist of a tiny protoplasmic body with a caryosome-nucleus, and arise from smaller amoeboid organisms which show typical schizogony."

The author continues: "Although these mice did not contain any other protozoan parasites in the intestine, I hesitate to connect positively the small amoeboid and schizogony forms with the newly introduced Sarcosporidian "spore" until further study actually demonstrates the transition."

A complete account of the investigations is promised.

H. B. F.

KALA AZAR.

- BASILE (Carlo). i. *La Meteorologia della Leishmaniosi Interna nel Mediterraneo. Nota 1.*—*Atti. d. R. Accad. d. Lincei. Rendiconti.* 1914. Apr. 5. ser. 5. Vol. 23. (1 semester.) No. 7. pp. 539-542.
- ii. *La Meteorologia della Leishmaniosi Interna nel Mediterraneo. Nota 2. Contributo Critico agli Esperimenti di Trasmissione.*—*Ibid.* Apr. 19. No. 8. pp. 625-629.

i. In this paper the author emphasises his belief that the possibility of transmission of leishmania from dog to man by means of fleas (*Ctenocephalus canis*) and the development of the leishmania in the fleas depend very intimately on the meteorological conditions of temperature and humidity. He has already shown that the optimum temperature for development of leishmania in the flea is 22° C., and that in nature fleas become infective most usually in the winter (December to March), and at other seasons when the conditions are the same. Many authors have shown that the cases of infantile kala-azar occur most frequently during the cooler months, and this, again, accords with the flea transmission view set forth by the author.

Tables are given showing the temperature conditions prevailing in Hydra, Palermo, and Messina, during the various months of the years 1909 to 1913. In Hydra during the months November to April the maximum temperature varied from 18° to 22° C., and it was during these months that the majority of cases of infantile kala azar were recognised. Cases also occur, but in smaller number, up to a maximum temperature of 30° C. The few cases which appear during the warmer seasons may be due to failure of recognition or longer incubation. Similar conditions prevail in the case of Palermo and Messina.

These facts, in the author's opinion, bear out his view that the flea is the transmitter of kala azar, but that it can only do so when the requisite conditions of temperature exist. He believes also that the atmospheric humidity must have some influence, but that there is great difficulty in estimating its effect.

ii. In the second note the author criticises the experiments which have led certain observers to doubt the validity of the flea transmission hypothesis. He points out that his own experiments were conducted during the winter months, when the meteorological conditions answered the requirements set forth above, while the development of the leishmania in the fleas was followed after they had been kept at an optimum temperature of 22° C. SERGENT in Algeria obtained a positive transmission from dog to dog by fleas which had been kept at 22° C. after having fed on the infected dog, while the experiment was commenced in February, when the right conditions prevailed (this *Bulletin*, Vol. I, p. 368). The negative results of the experiments of MASSAGLIA, MARSHALL, and WENYON were due to these observers not having discovered if the fleas were harbouring flagellates of the leishmania type and, further, to the experiments being conducted under other than the necessary meteorological conditions.

A similar criticism is made of the experiments of PEREIRA DA SILVA who, on April 27th, placed a pup one month old to live with his experimentally infected dogs. At various times fleas whose faeces

were known to contain flagellates of the leishmania type were transferred from the infected to the healthy dog. The dog died in December without any sign of infection. Basile claims that the meteorological conditions were favourable for the development of the leishmania in the fleas, but that the necessary conditions no longer existed (June to December) when the fleas could have transmitted the infection to the healthy dog.

[In connection with Basile's experiments and the criticism he makes of the negative ones conducted by others, it is well to remember that Basile himself produced no evidence that the flagellates observed by him in the fleas were other than natural flagellates of these insects. The negative results of other observers are in large part due to their having taken the trouble to exclude such natural flea infections. Moreover, the percentage of leishmania infected fleas discovered by Basile corresponds very closely with the percentage of naturally infected fleas in kala azar free countries, so that the inference is that the flea flagellates supposed to have developed from the leishmania by Basile are really nothing more than the natural parasite of the fleas.

As regards the positive transmission experiments from dog to dog by fleas, as described by Basile, we must remember that these were carried out in Bordonaro or Rome, in both of which places Basile described a high percentage of naturally infected dogs, so that there exists the possibility that his experimental animals were already infected when the experiment began.]

C. M. Wenyon.

PATTON (W. S.). **The Behaviour of the Parasite of Indian Kala Azar in the Dog Flea, *Ctenocephalus felis*, Bouché, with some Remarks on Canine Kala Azar and its Relation to the Human Disease.**—*Indian Jl. Med. Research*. 1914. July. Vol. 2. No. 1. pp. 399-403.

This important paper records observations the author has made upon the behaviour of *Leishmania donovani* in the Indian dog flea, *Ctenocephalus felis*. The experiments were made upon a dog which had been infected from a case of kala azar. Four days before the dog died there were as many as 500 parasites in each film of the peripheral blood, so that the several hundred bred fleas which fed upon the dog at this time had certainly taken up many parasites. Two days before the dog died 1,000 parasites were present in each film of the peripheral blood. The experiments were conducted during the cold weather, and the alimentary tracts of more than 200 fleas were examined.

The parasites, two hours after ingestion by the fleas, were still within the leucocytes in the mid-gut, and many infected leucocytes were being found in the faeces. Many of the parasites in the cells appeared to be degenerating.

Four hours after ingestion the leucocytes were degenerating and the parasites being liberated; none of these showed any signs of development but were, on the contrary, indistinct and breaking up into granules.

Six hours after ingestion there was a marked diminution in the number of parasites, and those which were still present were almost completely degenerated. A few faintly staining forms were found in the hind-gut and rectum.

After eight hours it was exceedingly difficult to recognise a single parasite, while all fleas dissected at later intervals did not contain any parasites.

These facts are in marked contrast to those of BASILE and others who claim that the dog flea is the transmitter of Mediterranean kala-azar, and that the leishmania undergo development in them.

The author refers to the recent experiments of LAVERAN and FRANCHINI, who have shown that the *Herpetomonas ctenocephali* is pathogenic to the mouse, and that the duration of the disease varies from 24 to 123 days. A white rat inoculated from the heart blood of an infected mouse also became infected, while a dog inoculated intraperitoneally with emulsion of the liver and spleen of a mouse infected with *H. ctenocephali* died in 53 days, the typical round parasites being found in the organs. The authors referred to have also infected white mice by feeding them on fleas (*Ceratophyllus fasciatus*) infected with *H. pattoni*. They have also infected mice by inoculating them with *Crithidia fasciculata* of *Anopheles maculipennis*, and by feeding them on *Melophagus ovinus* infected with *Crithidia melophagia* (see above, page 381). These experiments, Patton remarks, show that the dog is easily infected with *Herpetomonas ctenocephali*, and that the disease of dogs in the Mediterranean districts known as canine kala azar may be nothing more than infection with *Herpetomonas ctenocephali*, and have nothing to do with the human disease of the same name, the association of the two being only a coincidence. [It must not be forgotten, however, that in all the endemic centres of Mediterranean human kala azar, there dogs suffer from canine kala azar. It seems difficult to imagine that this is only a coincidence of two distinct diseases.]

The conclusions are:—

"1. The parasite of Indian kala azar does not develop in the dog flea *Ctenocephalus felis*, but degenerates and disappears in eight hours. This, together with the fact that the dog has not been found infected with kala azar, or perhaps to be exact, herpetomoniasis, in India, strongly supports the view that human kala azar is not of canine origin. The human flea, *Pulex irritans*, has not been found in Madras.

"2. Assuming that the parasites of Indian and Mediterranean kala-azar are identical, it is difficult to understand why the one does not develop in the flea, while the other does.

"3. The fact that the dog may be infected with *Herpetomonas ctenocephali* suggests that the so-called canine kala azar may have nothing to do with the human disease, and that its association with it is a coincidence. There is at present no proof that either *Ctenocephalus canis* or *Pulex irritans* transmits the parasite of human kala azar from dog to man and man to dog, and the hypothesis advanced by NICOLLE and so vigorously supported by BASILE and others appears to be based on very slender evidence."

C. M. W.

NICOLLE (Charles). *Chronique du Kala-azar en Tunisie.*—*Bull. Soc. Path. Exot.* 1914. June. Vol. 7. No. 6. pp. 479-481.

Kala azar in Tunis is a rare disease, for only eight cases have been observed in children since 1912, making a total of 38 cases for this district. During 1913, with the help of M. JANNOT, the author examined 109 stray dogs, and found six cases of infection. In the first quarter of the year there were two cases of infection out of 33 examinations, in the second quarter two out of 35, in the third quarter

two out of 36, and in the fourth none out of the small number of five examinations.

Referring to cultures of leishmania, the author remarks that five strains have been kept by subculture every two months. Two of these are *Leishmania donovani* from human cases and have reached the 100th and 56th subculture respectively; two of leishmania of canine kala azar have reached the 61st and 58th passage; while one of *Leishmania tropica* of oriental sore has reached the 109th subculture, and has been kept up since November, 1909. All these forms grow readily as little transparent colonies on the surface of the agar, and the flagellates have undergone no change in morphology during this time.

The author again draws attention to a form of splenic anaemia with splenomegaly occurring in young children a few months old, which has approximately the same mortality as kala azar. Up to the present no autopsy has been obtained, so that a careful study of the disease has not been possible.

C. M. W.

SPAGNOLIO (Giuseppe) & GIUGNI (Francesco). **Stato presente del Problema della Trasmissione della Leishmaniosi Interna nei Paesi del Bacino Mediterraneo. (Rivista sintetico-critica, 1^a Parte.)—Malaria e Malat. d. Paesi Caldi.** 1914. May-June. Vol. 5. No. 3. pp. 204-211.

As the title indicates, this is a review of the present position of Mediterranean kala azar, with special reference to work that has been done on the flea transmission hypothesis. It contains no new observations, and is based on work done by authors whose papers have already been reviewed in this *Bulletin*.

C. M. W.

RHO (F.). **Le Varie Forme di Leishmaniosi e le Loro Specie o Varietà Parassitarie.**—*Ann. di Med. Nav. e Colon.* 1914. Apr.-May. Ann. 20. Vol. 1. No. 4-5. pp. 429-436.

This paper contains a general discussion on Indian and Mediterranean kala azar, human and canine kala azar, and the relation of kala azar to cutaneous leishmaniasis, without contributing any new observations.

C. M. W.

[DIVARIS (S.).] ΔΙΒΑΡΗ (Σ.). 'Η νόσος Καλα-αζάρ ἐν Κεφαλληνίᾳ. [Kala Azar in Cephalonia.]—*Ιατρικὴ Προόδος.* 1914. Apr. 1 & 15. Vol. 19. Nos. 7 & 8. pp. 132-133.

An account of a fatal case of kala azar, in a child two years of age, observed by the author during a stay in Cephalonia (Ionian Isles). Five other cases were also noted. The disease would seem to have been recognised in Cephalonia for a long time past, and goes by the local name of Haplopinacon.

J. B. N.

VAGLIO (R.). **Contributo alla Ricerca del Parasita di Leishman nel Sangue Periferico di Bambini affetti da Leishmaniosi.** [The Finding of Parasites in the Peripheral Blood of Infected Children.]—*Pediatria*. 1914. Sept. Vol. 22. No. 9. pp. 682-686.

CANNATA just demonstrated that parasites could be found in the ordinary blood films made from the peripheral blood of cases of infantile kala azar. He had fifteen successes in sixteen consecutive cases of the disease. The writer of the paper under review has confirmed these observations by finding parasites in the peripheral blood of eleven cases, and this without any long or laborious search. The parasites were mostly in mononuclear cells, sometimes in polynuclears, and in two cases free in the plasma.

C. M. W.

GIUGNI (Francesco). **La Emocultura della *Leishmania donovani* dal Sangue periferico in un Caso di Kala-azar nel Bacino del Mediterraneo.**—*Pathologica*. 1914. June. Vol. 6. No. 134. pp. 284-285.

The author records the successful culture of leishmania from the finger blood of a case of infantile Mediterranean kala azar. In all, sixteen tubes of NNN medium were inoculated, and of the twelve remaining uncontaminated, two showed growth of flagellates on the 12th and 14th days respectively.

C. M. W.

GIUGNI (Francesco). **Richerche sulla Vitalità e lo Sviluppo della *Leishmania donovani* nei Terreni Culturali.** [Vitality and Development of *L. donovani* in Cultural Media.]—*Malaria e Malat. d. Paesi Caldi*. 1914. May-June. Vol. 5. No. 3. pp. 156-161.

The two successful results obtained by MAYER and WERNER, and by WENYON, who cultivated leishmania from the peripheral blood of cases of Indian kala azar in NNN medium, led the author to try the experiment on Mediterranean infantile kala azar. After many failures it was thought that the condition of the medium might be the cause of the lack of development. Accordingly, the author made three series of media, using human, rabbit, and dog blood. In each series the quantities of agar (14 grams) and water (1 litre) were the same, but the amount of sodium chloride added varied from nothing up to 19.8 grams per litre. No development was obtained in the human blood medium, but good development in the rabbit- and dog-blood media, but only in those tubes which had sodium chloride in quantity varying from 5.25 to 9.24 grams per litre. In media containing this quantity of salt the red corpuscles remained intact, so it was thought that this was possibly a necessary condition. Another series of media of the same kind was made, but to which was added the same quantity of rabbit's blood previously laked. Though the leishmania would develop in this, they became inactive in 15 to 20 days, while in the medium with intact corpuscles they remained active for a much longer time. Accordingly the author concludes that intact red cells in the fluid is essential for the prolonged vitality of the flagellates. Attempts were made to grow the flagellates in Row's medium, which consists of a laked blood to which a quantity of salt has been added. This

medium, which does not contain intact red cells, has not proved, in the author's hands, so successful as the usual NNN medium.

As regards the failure of the leishmania to grow in the human blood medium, the author points out that this has a direct bearing on the cultivation of leishmania from the peripheral blood of cases of kala azar, and concludes that it is the addition of this human blood to the medium which generally prevents the growth of the leishmania. In MAYER and WERNER's and WENYON's cases, where successful culture was obtained, the blood happened to be in a condition which did not inhibit growth.

C. M. W.

CANNATA (S.) & CARONIA (G.). **Cultura dei Parassiti di Leishman dal Sangue Periferico nella Leishmaniosi Infantile.**—*Pathologica*. 1914. Aug. 15. Vol. 6. No. 138. pp. 396-398.

After many failures, the authors have succeeded in cultivating leishmania from the blood drawn from the median basilic vein of a case of Mediterranean infantile kala azar. About 2 cc. of blood was drawn from the vein and distributed in twelve tubes of medium—six of NNN medium, and six in a modification of the Bordet and Gengou medium prepared as follows:—100 grams of broken-up potato are brought into 200 grams of a 5 per cent. watery solution of glycerine, and the whole raised to 120° C. for 15 minutes. The liquid is decanted and to every 50 cc. there is added 150 cc. of 9 per cent. sodium chloride solution and 5 grams of agar. This agar is employed as in NNN medium with defibrinated rabbit's blood in the proportion of 1 of blood to 2 of agar.

At the same time, two tubes of each medium were inoculated with spleen puncture fluid. In the two NNN tubes there was abundant growth in ten days, whereas in the two tubes of the new medium this took only seven days. Of the twelve tubes inoculated from the blood, growth was noted in two of the new medium on the tenth day. This had become an abundant growth by the twenty-fifth day. All the other tubes remained sterile.

Remarking on the results of GIUGNI, the authors do not think the view set forth by him is correct, viz., that the human blood added to the NNN medium in inoculating the tubes prevents the growth of leishmania, for their own success, and the previous ones of MAYER and WERNER and WENYON, serve to show that the human blood added did not prevent multiplication.

C. M. W.

LUNA (Francesco). **Particolarità Culturali del Parassita di Leishman nel Terreno di NNN.**—*Pathologica*. 1914. Sept. 1. Vol. 6. No. 140. pp. 443-445.

As other observers, the author has noted that the parasite of kala azar will grow and multiply on the surface of the agar in tubes of NNN medium. The parasite grows quite well under anaerobic conditions, but though multiplication takes place in an atmosphere of hydrogen, death soon results. Similarly, in oxygen there is slight development, but the cultures soon die. On the surface of the medium the flagellates are of a rounded type, but showed no variations according to the atmospheres in which they grew.

C. M. W.

PATANÈ (C.). *Sulla Trasmissibilità della Leishmania infantum ai Topi Albini.*—*Boll. Accad. Gioenia Scienze Naturali in Catania.* 1914. May. Ser. 2. No. 31. pp. 62-66.

The author has infected fourteen white mice with culture of *Leishmania infantum*. Half a cubic centimetre of culture was injected intraperitoneally, and 24 hours later a further half cubic centimetre intravenously in the caudal vein. Four of the mice under 10 grams weight died within a few days, and in two of these leishmania were recovered by culture from the spleen or marrow. In one they were seen in small numbers in smears of the spleen and marrow. The other mice were larger and survived a longer period. In only one of these was infection demonstrated by culture from the spleen.

C. M. W.

IUSPA (V.). *Azioni di alcuni Derivati della Chinina sulla Leishmania infantum in vitro.*—*Boll. Accad. Gioenia Scienze Naturali in Catania.* 1914. May. Ser. 2. No. 31. pp. 60-62.

The author has investigated the action of 20 compounds containing quinine on the flagellate forms of *Leishmania infantum*. A table is given giving the dilution required to render the flagellates immobile in 30 minutes. The most potent is isoamyl hydro-cuprein, which is active in a dilution of 1 in 7500.

C. M. W.

CANINE LEISHMANIASIS.

PRINGAULT (E.). *La Leishmaniose Canine à Marseille.*—*Bull. Soc. Path. Exot.* 1914. June. Vol. 7. No. 6. pp. 484-488.

The author has continued his observations upon the stray dogs of Marseilles. He has now examined 310 such dogs, and has found amongst these five cases of leishmania infection. The percentage (1.61) of dogs in Marseilles naturally infected with kala azar is about the same as that observed in the endemic centres of Tunis and Algeria.

Enquiry has shown that there is very little possibility that any of the infected dogs had entered Marseilles from elsewhere, so that it may be accepted that canine kala azar is endemic in Marseilles, as in other places in the Mediterranean area.

In a discussion following upon Pringault's announcement LAVERAN points out that there is no need for alarm that kala azar will be found to be widespread amongst human beings as, up to the present, no human cases have been encountered in Marseilles.

C. M. W.

NICOLLE (Charles) & CONOR (Marthe). *Difficulté de Conservation du Virus de la Leishmaniose Canine par les Passages.*—*Bull. Soc. Path. Exot.* 1914. June. Vol. 7. No. 6. pp. 481-484.

This paper contains a record of experiments directed towards the maintenance of a strain of leishmania by passage through animals. The virus was obtained from a naturally infected dog in Tunis. This led to the infection of two out of three inoculated dogs, and the probable infection of three out of four inoculated monkeys. (In the case of

the monkeys there was wasting and enlargement of the spleen, though parasites were not found). The second passage was made from the spleen of one of the dogs, and led to the infection of one out of four monkeys inoculated, and none out of three dogs, which unfortunately died of piroplasmosis at a date too early for certain leishmania diagnosis. The third passage from the monkey led to the infection of two mice and one of two monkeys inoculated. The fourth passage was made by inoculating the monkey virus into three monkeys and two mice, none of which became infected. The fourth passage thus proved unsuccessful and demonstrates the difficulty of keeping up a strain of leishmania in experimental animals.

C. M. W.

TROPICAL SORE.

SERGEANT (Edm. & Et.), LEMAIRE (G.) & SENEVET (G.). *Insecte Transmetteur et Réservoir de Virus du Clou de Biskra. Hypothèse et Expériences Préliminaires.*—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 577-579.

The authors have studied the conditions regulating the occurrence of oriental sore in Biskra. They are convinced that some winged biting insect is responsible and believe that *Phlebotomus* is the most probable transmitter. In Biskra there occur two species—*P. papatasi* and *P. minutus*. As *P. minutus* feeds upon man and also on the gecko (*Tarentola mauritanica*) which is common in the houses of Biskra, the authors instituted an examination of these animals as a possible reservoir for the virus of oriental sore. The enquiry has given the most interesting result that the organs of the geckos inoculated on to culture medium have given, in 15·7 per cent. of cases, a culture of flagellates of the leptomonas type, and very similar to those obtained from oriental sore. The authors have also isolated a leptomonas from the blood of geckos from Béni-Ounif-de-Figuig (South Oranais).

In 14·4 per cent. of cases a culture of trypanosomes was obtained which were quite distinct from the leptomonas, and represent, without doubt, the *Trypanosoma platydictyli*, which was discovered in 10 per cent. of the Biskra geckos.

The authors merely record the observation without committing themselves to any speculations as to the origin or meaning of the leptomonas obtained in culture.

C. M. W.

GIUGNI (Francesco) & LA CAVA (Francesco). *Note Cliniche sopra un Focolaio Familiare di Bottone d'Oriente.* [Clinical Note on a Family Focus of Oriental Sore.]—*Malaria e Malat. d. Paesi. Caldi.* 1914. May-June. Vol. 5. No. 3. pp. 201-204. With 1 plate.

The authors record what appears to be an endemic focus of oriental sore in a single family in which there were seven sons, the youngest of whom was suffering from a typical sore in which leishmania were easily demonstrated. It was ascertained that three of the elder brothers had also suffered from a similar disease when young. The brothers, when examined by the authors, were found to have the characteristic scars of oriental sore. The second case occurred seven

years after the recovery of the first, the third three years after the second and the fourth about eight years later. This observation shows that oriental sore has existed in Bovalino (Calabria) for at least twenty-one years, and naturally raises the question as to whether it was merely a coincidence that the four brothers, who all lived in the same house, should have all contracted the disease, or whether it indicated that there existed in this house some persisting cause in the shape of ectoparasites.

C. M. W.

MANTEGAZZA (Umberto). *Leishmaniosi Cutanea in un Soldato reduce dalla Libia.*—*Malaria e Malat. d. Paesi Caldi.* 1914. May-June. Vol. 5. No. 3. pp. 188-194.

This is a long paper describing a typical case of oriental sore in an adult, a soldier who apparently contracted the disease in the neighbourhood of the town of Tripoli. The chief interest lies in the locality, which appears to be a new one for this disease.

C. M. W.

VIGNAT (Marcel). *Presentation d'un Malade atteint d'une Lésion Ulcéreuse (Bouton de Biskra) ayant résisté Six Ans à Divers Traitements et guérie par une Seule Cautérisation à L'Air Chaud.*—*Bull. Soc. Française de Dermatol. et Syph.* 1914. Apr. Vol. 25. No. 4. p. 194.

The author presented at the Society a case of oriental sore of Biskra of six years standing, which was completely cured by a single exposure to hot air (750° C.) applied after local anaesthesia had been produced by stovaine.

The case had given a positive Wassermann reaction, and had accordingly been treated by twenty-five injections of benzoate of mercury and four grams of potassium iodide per diem by the mouth, without any good results.

C. M. W.

GIUGNI (Francesco). *Due Nuovi Casi di Reperto Culturale della Leishmania tropica del Bottone d'Oriente.*—*Malaria e Malat. d. Paesi Caldi.* 1914. May-June. Vol. 5. Nu. 3. pp. 183-185.

In a former note the author has recorded his successful culture of *Leishmania tropica* from a case of Italian oriental sore. He has since had further success in obtaining cultures, from two other cases from Bovalino. The author thinks that better results are obtained if the agar for making the N.N.N. medium is soaked in distilled waer (changed several times) for 24 hours before use, and that there is an optimum temperature of 28° to 29° C. for *Leishmania tropica* in contradistinction to an optimum temperature of 21° to 22° C. for *Leishmania donovani*.

C. M. W.

LAVERAN (A.). Infections expérimentales de les Souris par la *Leishmania tropica*.—*Comptes Rend. Acad. Sci.* Vol. 159. p. 539. (Séance du 5 Octobre, 1914).

The author refers to previous work by himself and others which showed that a general infection of mice could be produced by *Leishmania infantum*. In such cases the parasites occurred in the liver, spleen and bone-marrow. GONDER recorded the results of experiments with *Leishmania tropica* in which mice inoculated with cultures developed a general infection, and also lesions of the tail, feet, and ears, in all of which parasites occurred. Row, on the other hand, produced only a general infection comparable with that produced by the infection of *Leishmania donovani* or *Leishmania infantum*.

In order to control these results Laveran has infected mice intraperitoneally with cultures of *Leishmania tropica* obtained from NICOLLE in Tunis, this being the strain employed by GONDER. In all, twelve mice were inoculated—eight males and four females. Of the males six became infected and of the females none. In all the males infected it was noted that towards the fourth month there was enlargement of the testicle causing an oblong tumour lying across the posterior part of the abdomen. The skin over the tumour in some cases showed slight excoriations. Puncture of the mass yielded a fluid containing enormous numbers of leishmania. Curiously enough no parasites could be discovered in the liver, spleen or marrow, and this in spite of the fact that there was a great enlargement of the spleen.

The author also inoculated three *Meriones shawi* caught in Tunis. The one male amongst them became infected and presented lesions identical with those observed in the male mice.

The tumour is produced not only by the enlarged and lardaceous testicle, but by an enveloping mass of neoplastic tissue in which also the leishmania occur. The parasites are typical *Leishmania tropica*.

The author attributes the difference in his results from those of GONDER and Row to variation in the method of inoculation, or the virulence of the strain.

C. M. W.

PAVONI (Giovanni). La Deviazione del Complemento nella Leishmaniosi cutanea.—*Pathologica*. 1914. May 15. Vol. 6. No. 133. pp. 264–266.

The author has tested the reaction of deviation of the complement in the case of cutaneous leishmaniasis. It is found that the serum of persons infected with extract of spleen and liquid from cultures of leishmania constantly and completely prevent haemolysis, even in very small doses. In an exactly similar manner prevention of haemolysis is brought about by the serum of rabbits which have been treated with dead cultures of *Leishmania infantum*. The results have been controlled by the use of serum of normal human beings and rabbits.

C. M. W.

JEANSELME (M. E.). **Leishmaniose cutanée et Réaction de Wassermann.**
—*Bull. Soc. Française de Dermatol. et Syph.* 1914. Apr. Vol. 25.
No. 4. p. 194.

The author mentions two cases of oriental sore—one from Biskra and the other from South America—which were examined for the reaction of Wassermann. In both cases this was negative, so that the author concludes that oriental sore does not belong to that group of tropical diseases (yaws, sleeping sickness, leprosy) which may give positive reactions.

C. M. W.

LINDSAY (J. W.). **American Forestal Leishmaniasis.**—*Trans. Soc. Trop. Med. & Hyg.* 1914. July. Vol. 7. No. 7-8. pp. 259-263.

The author, who has been resident in Paraguay for fourteen years, makes some remarks upon the dermal leishmaniasis. He mentions that the most common site for the primary ulcer or sore is on the ankles, wrists or hands. The tip of the ear is also a common site, or even the back, or just above where the men wear their belts when stripped to the waist. It is stated that the natives all regard the disease as of a general nature, and that they fear that the disease will "ascend to the nose." The author believes that the idea of general infection is borne out by the fact that the nasal lesions may appear months after complete healing of the primary lesion, where no chance of a second infection has existed.

As regards the mode of infection, the author records the following incident. Eleven years ago work was started in the virgin forest by workers consisting of an overseer and forty peons, amongst whom was one man who had come from lumber works fifty miles to the north. He had a buba ulcer on the leg. Within a year all the other men had contracted ulcers and of all the 41 affected persons, all except one have since developed nasopharyngeal lesions. In nearly every case the patient blames the bite of some insect—either ticks or flies. The ticks (*Amblyomma striatum*) are found adhering to the skin when the peon awakes in the morning. The fly most usually blamed is the *Simulium*. Both the fly and the tick feed on the rattle-snake, and the natives think that these insects convey the virus from the snakes to man.

C. M. W.

VIANNA (Gaspar). **Leishmania brasiliensis als Parasit glatter Muskelfasern.** [*L. brasiliensis as a Parasite of Smooth Muscle Fibres.*]
—*Memorias do Instituto Oswaldo Cruz.* 1914. Vol. 6. No. 1.
pp. 40-42. With 1 text fig.

Reference is made to PEDROSO's discovery of cutaneous leishmaniasis of dogs in S. Paulo (this *Bulletin*, Vol. 3, p. 557). The author of the note under review received a slide showing a section of the nasal mucosa of an infected dog. In this section leishmania were present, and a careful study showed that the smooth muscle fibres of the arterioles were in places infected with them. The parasites appeared to have very little, if any, ill effect upon the muscle cells, and the author regards this muscle cell infection as showing that the leishmania

are more nearly related to the trypanosomes (*Trypanosoma cruzi*) than has hitherto been supposed. The invasion of these cells further indicates that there must be some mobile flagellate or amoeboid stage of the parasite, which he writes of as *Leishmania brasiliensis*.

C. M. W.

TERRA (F.). Leishmaniose Tégumentaire au Brésil.—*Boletim da Soc. Brasileira de Dermatologia*. 1913. Vol. 2. No. 2-3. pp. 58-68. With 1 map.

A general description of the cutaneous leishmaniasis of Brazil. The purely cutaneous disease, and the much more serious one in which the mucosae of the nose and mouth are affected, are again described. It has been recorded from all parts of Brazil north of the Tropic of Capricorn.

As regards treatment, the only drug which has given good results is antimony tartrate in 1 per cent. solution in physiological serum, sterilised by filtration through a Berkefeld filter in the cold. Five cubic centimetres are injected on each of five successive days into the vein at the bend of the elbow. The purely cutaneous lesions quickly heal, but the mucosal ones are much more obstinate and require several courses of treatment.

C. M. W.

da SILVA (Piraja). Tratamento da Leishmaniose Cutaneo-Mucosa, pelo Tartaro Emetico.—*Arch. Brasileiros de Med.* 1914. Apr. Vol. 4. No. 4. pp. 271-280. With 2 plates.

Attention is drawn to the marvellous results sometimes obtained in the treatment of the muco-cutaneous leishmaniasis of South America. The author describes the method of treatment as the "Brazilian method," which consists in the intravenous injection of a 1 per cent. solution of tartar emetic in physiological serum. He has made 500 such injections in various cases, and has never noted any serious symptoms result.

C. M. W.

LAPA (Alvaro). Deux Cas de Leishmaniose cutanée.—*Medicina Contemporanea*. 1914. June 28. Vol. 32. No. 26. pp. 203-207. With 5 text figs.

This paper contains a record of two cases of dermal leishmaniasis from Brazil. In one of these the nasal mucosa was involved in addition to the skin. The case with involvement of the nasal mucosa was treated without benefit with salvarsan, the other with intravenous injections of 1 in 100 tartar emetic on alternate days, commencing with a dose of 3 centigrams. Signs of healing were seen after the sixth injection, and cicatrization was complete after three weeks.

C. M. W.

REBAGLIATI (Raul). **Etiologia de la Uta.**—*Cronica Medica, Lima.*
1914. June 15. Vol. 31. No. 611. pp. 169-172.

The disease, which has been known under various names, such as *Uta* in the Sierra of Peru, *Kjapa* in Montana, *Tiacc-arana* in the mountainous districts of Cuzco and Ayacucho, *Llaga* in Junin, *Gálico* in Amazonas, is now shown by the author to be a form of cutaneous leishmaniasis. In smears from the lesions the author has encountered the various forms of *L. tropica* which have been described from the oriental sore of India and elsewhere. He also claims to have seen flagellated forms, such as are met with in culture of leishmania.

[A paper on the subject of the occurrence of leishmania in Uta by STRONG and others was reviewed in this *Bulletin*, Vol. 3, p. 142.]

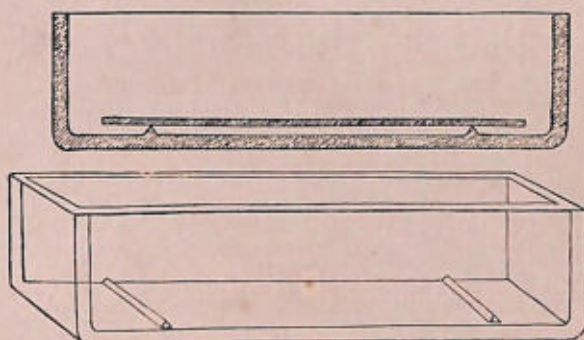
C. M. W.

MISCELLANEOUS.

GIEMSA (G.). **Zur Schnellfärbung (Romanowsky-Färbung) von Trockenausstrichen.** [A Quick Staining Romanowsky Method for Dried Smears.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1914. May 2. Vol. 73. No. 7. pp. 493-496. With 1 text fig.

Reference is made to the method devised by the author in 1904 (Giemsa's stain) and also to a quick staining method described in 1910 (*Münchener med. Wochenschr.* No. 47, p. 2476). The details of the present quick staining methods are as follows:—

(1) Air-dried thin smears on slides are laid film side upwards in a dry horizontal staining bath (*vide* diagram).



(2) Eight to fifteen drops of the combined staining and fixing solution (Farbfixierlösung)* are then dropped on the film. Evaporation can be prevented by covering the bath with a glass sheet. The stain is left on for half a minute but on no account longer than one minute.

(3) A little of a mixture of 10cc. distilled water and ten drops of the fixing and staining solution are then added to the stain in the bath. Gentle moving of the bath ensures a thorough mixture of the two. This is left on for ten minutes.

(4) Wash in water, dry and mount, either in liquid paraffin, or in acid free balsam.

By this method malarial parasites and other blood parasites are suitably stained. The whole technique only takes eleven minutes or a little more for completion.

G. C. L.

GIEMSA (G.). **Paraffinöl als Einschlussmittel für Romanowsky-Präparate und als Konservierungsflüssigkeit für ungefärbte Trockenausstriche.** [Paraffin Oil as a Medium for Mounting Romanowsky Preparations and as a Preserving Fluid for Unstained Dried Smears.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Vol. 70. No. 7. pp. 444-446.

The fading of aniline or Romanowsky stained specimens in Canada balsam is well known. In order to prevent this the author has

* Azur II-Eosin 3 g, Azur II 0.3 g. in Glycerine 25 g. + Methyl-alcohol 475 g. Warm and mix, then after cooling, filter and allow to stand for a considerable time.

employed paraffin oil (liquid paraffin) for mounting. If the specimens are mounted in this, the stain is retained, and fading does not take place. The method is equally good for preserving unstained dried smears and keeping fungi from growing on them.

G. C. L.

FRICKS (L. D.). **Rocky Mountain Spotted Fever. Some Investigations made during 1912 by Passed Asst.-Surg. T. B. McClintic.**—*U.S. Public Health Rep.* 1914. Apr. 24. Vol. 29. No. 17. pp. 1008-1020.

As previously stated [see this *Bulletin*, Vol. 2, p. 103] McCLINTIC unfortunately contracted the disease at the end of 1912 and died of it. He was thus denied the satisfaction of reporting the valuable observations made by him during his last season's work. The author (Frick) has now collected these observations and prepared them for publication. They include:—“(a) the first systematic determination of the percentage of infective ticks from different localities in the Bitter Root Valley, (b) the discovery of immune and, therefore, presumably previously infected ground squirrels (*Citellus columbianus*) in nature, (c) studies on the susceptibility of the woodchuck (*Marmota flaviventer*), the rock squirrel (*Callospermophilus lateralis cinerascens*), and the mountain goat (*Oreamnos montanus*) to Rocky Mountain spotted fever, and (d) studies on the efficiency of different dipping solutions used for the destruction of adult ticks on live stock.”

(a) “In 1912 McClintic collected nearly 2,000 ticks from different localities in the Bitter Root Valley and from Bannock County, Idaho. These ticks . . . were placed in groups on susceptible guinea-pigs and there allowed to feed until completely engorged. . . . Of the total number of ticks collected, 1,570 were actually employed in these experiments and 1,282 were known to have fed a sufficient length of time to infect their hosts.” The ticks from the Bitter Root Valley were generally unfed *Dermacentor andersoni* (Stiles) collected from the grass and bushes, and those from Idaho were *Dermacentor modestus* (Banks). A table gives a detailed account of the experiments with the number of positive results obtained.

(b) By a series of careful experiments McClintic was able to establish “the existence of immune, and therefore presumably naturally infected, ground squirrels on the west side of the Bitter Root Valley. He also discovered a difference in the percentage of immune squirrels from different localities, which appears to bear a close relation to the degree of Rocky Mountain spotted fever believed to exist in those localities.”

(c) During 1912 a series of experiments with woodchucks, similar to those performed on ground squirrels, was conducted. The animals were inoculated with a known spotted-fever virus and inoculations of heart blood were made from them after definite intervals into susceptible guinea-pigs. Of the fifteen, eleven were shown to be susceptible to infection with the virus, while three were not so—these may have derived their immunity, the author thinks, from a previous infection acquired naturally. As regards rock squirrels eleven were injected with the virus. Four of these transmitted the infection to

guinea-pigs but the remaining experiments were not completed. [The article stops here abruptly and there is no statement made as to whether it is to be continued or not.]

G. C. L.

NUTTALL (G. H. F.). "Tick Paralysis" in Man and Animals.—*Parasitology*. 1914. May. Vol. 7. No. 1. pp. 95-104.

A further series of published records of tick paralysis is given. Cases are described of this disease in sheep in Cape Colony and in man in Oregon, no fewer than thirteen cases being reported from this State. The author comments upon these cases. The finding of ticks on the head in a country where those parasites are common, he believes, might merely be due to a coincidence, but the experimental results obtained by HADWEN on sheep and by NUTTALL and HADWEN on the dog show that we are dealing with a definite affection. No particular species of tick appears to be concerned in the causation of tick paralysis, since *Dermacentor venustus* in British Columbia and *Ixodes pilosus* in South Africa both appear capable of inducing this affection. The author suggests further investigation to elucidate the nature of the disease and to determine what species of ticks are capable of producing it.

G. C. L.

LINNELL (R. McC.). Note on a Case of Death following the Sting of a Scorpion.—*Lancet*. 1914. June 6. pp. 1608-1609.

The patient was stung by a scorpion on the left heel and for the cure of this his friends had made him eat the head of the scorpion. On the fourth day after receiving the sting, paralysis of the legs set in, spreading up to the umbilicus. Sensation was unaltered. On the sixth day there was retention of urine and on the ninth day sugar appeared in the urine. On the thirteenth day the patient became comatose and death intervened on the fifteenth day. No full autopsy was permitted but a piece of spinal cord was examined at the Medical Research Institute, Kuala Lumpur. Microscopically the cord was found to be affected with acute disseminated myelitis. The scorpion in question was a small brown specimen which the natives declare to be very vicious and deadly. Although scorpions' stings are fairly common in the Malay States, deaths are extremely rare.

G. C. L.

BREINL (Anton). Preliminary Report on the Journey to New Guinea—June to August, 1912.—*Papua Annual Report for the Year 1912-13*. Printed and Published for the Government of Australia by Albert J. Mullett, Government Printer for the State of Victoria. Appendix "B". pp. 155-158.

Malaria.—The most prevalent disease seen in New Guinea was malarial fever. Cases were found in abundance in every district visited and the disease was equally prevalent amongst the white settlers and amongst the natives.

Dysentery.—"Although malaria is the most prevalent disease epidemic dysentery is of much greater economic importance. . . . A perusal of the early yearly reports seems to indicate that the disease has been introduced into New Guinea at a comparatively recent period."

Leprosy.—Cases of true leprosy were found only in two districts: Mekeo and the Trobriand Islands. Both forms, nerve leprosy and nodular leprosy, were encountered.

Gangosa.—"One of the most interesting diseases observed was Gangosa (Rhinopharyngitis ulcerosa). One case of this disease was found in the Samarai Hospital and several cases in the villages along the south coast, the greatest number in Kerapuna. Numerous cases were also observed in the Mekeo District."

The disease as a rule "begins with the formation of ulcers in the neighbourhood of the nose and on the upper lip. At first an oedematous swelling is noted which afterwards ulcerates, the ulceration, as a rule, progressing into the cavity of the nose, destroying the cartilaginous septum and attacking the hard and soft palate. In the latest stages the nose has completely disappeared." The disease is peculiar to the South Sea Islands and to certain parts of the east. Cases have been observed in Guam, in Manila, etc., and a number of patients suffering from the same disease were encountered on Murray Island on the occasion of a visit made by the author to the Torres Straits Islands in 1910.

Beriberi.—A few cases of true beriberi were seen. Syphilis, yaws, ulcerative granuloma and sores of various sorts were also met with, whilst skin diseases offer a most interesting field for investigation. *Tinea imbricata* is especially common.

G. C. L.

SCHMITTER (Ferdinand). **Quarterly Report of the Board for the Study of Tropical Diseases as they exist in the Philippine Islands.**—*Military Surgeon*. 1914. Mar. Vol. 34. No. 3. pp. 222-228. With 3 text figs.

After Major ASHBURN left Manila the author remained as the only member of the Board on duty. Two cases of gangosa were observed; both gave the Wassermann reaction. A positive reaction was also obtained by the luetin test, but this was mild in comparison to the vigorous reaction usually seen in cases of syphilis with similar extensive lesions. This suggests to the author that the reaction in gangosa is that of a related organism rather than of the *Treponema pallidum*. In tissue removed from the ulcerating margins *Treponema* similar to *pallidum* or *pertenue* were observed. He concludes that the weight of evidence is in favour of gangosa being a form of yaws and that it is due to a *Treponema* morphologically resembling that found in the latter disease.

Seven cases of sprue were studied; two of these had a history of syphilis while the others gave negative reactions to the Wassermann test. Repeated examinations of scrapings of mouth ulcerations failed to show any spirochaetes with the dark-field illuminator. Examinations of the stools were also negative. Cultures were made from the mouth ulcers and two peculiar streptothrices were obtained.

Twenty-five cases of leprosy were studied clinically and microscopically. Experiments were also carried out for the purpose of finding a prophylactic against scurvy.

G. C. L.

CASTELLANI (Aldo). Report of Investigation Work carried out at the Clinic for Tropical Diseases and Bacteriological Institute, Colombo, Ceylon, during the Period extending from 1st July 1913, to 31st January 1914.—Report to the Advisory Committee of the Tropical Diseases Research Fund. Received in Colonial Office March 14, 1914.

Researches were carried out on the following subjects:—

- (1) Cases of fever due to *Bacterium columbense* (Cast. 1905).
- (2) *Vibrio kegallensis* (Cast. 1913).
- (3) Further researches on the mixed typhoid + paratyphoid A + paratyphoid B vaccine.
- (4) Further case of entoplasmosis.
- (5) A probably new type of ulcerative dermatitis.
- (6) Skin disease with gummata, due to a fungus.
- (7) A peculiar yellow pigmentation of the skin.

(1) The organism was named in 1905, but in subsequent publications the author has identified it wrongly with *B. paratyphosus* B. Recently, having had the opportunity of isolating the same germ again in two cases, he has decided that it is a separate species; therefore the name *B. columbense* holds.

Clinically the cases were very similar to typhoid, the fever lasting from three to five weeks and ending by lysis. In one case there were several relapses.

(2) *Vibrio kegallensis* is the name given to a vibrio which was isolated from the stools of a patient of Kegalle suffering from a cholera-like diarrhoea.

(3) Further researches are detailed of a vaccine made with typhoid, paratyphoid A and paratyphoid B. The conclusions reached after these new researches are that it is highly desirable to use—instead of the usual simple typhoid vaccine—the mixed typhoid + paratyphoid A + paratyphoid B vaccine in countries where the three diseases are met with.

(4) Another case of what the author has termed entoplasmosis has been met with in a passenger from Burma. The patient complained of severe griping pains and diarrhoea with muco-pus and blood in the stools. Protozoal bodies identical with those described in a previous report were found [see this *Bulletin*, Vol. 3, p. 464].

The other investigations are interesting to dermatologists. In the new type of ulcerative dermatitis described the lesions are painful and very slow to heal, complete spontaneous cure seldom taking place in four to six months; on healing, patches of hyperpigmentation often remain. As regards "yellow disease," the bright yellow colour is quite different from what one sees in jaundice; moreover the sclerotics remain white, the urine and stools are of a normal colour, the condition of the liver is normal and the general health quite good. On the hypothesis that the condition might be parasitic Castellani tried a

formalin spirit lotion, but the most successful measure consisted in sending the patients up country where the pigmentation disappeared almost completely.

G. C. L.

KERNÉIS. Pian, Likoutombo (Fièvre éruptive spéciale), Bérubéri au Moyen Congo. Extrait du Rapport annuel de 1912. [Clinique d'Outre Mer.]—*Ann. d'Hyg. et Méd. Colon.* 1914. Jan.-Feb.-Mar. Vol. 17. No. 1. pp. 229-233.

The treatment of yaws by '606' is first mentioned; favourable results—as have now been so frequently reported from other parts of the world—were obtained.

A peculiar eruptive fever which the natives call Likoutombo was studied. The malady commences with an angina, together with nasal and ocular catarrh and fever. The latter often attains to 40·3° C. but more generally remains about 38·5°. The temperature lasts only about a day and when it subsides the ocular nasal catarrh also becomes better. On the third day of the illness an eruption composed of small papules appears, this giving the skin a shagreen appearance. The eruption appears at first on the face but afterwards spreads rapidly to the whole of the body. The exanthem lasts one or sometimes two days, a furfuraceous desquamation then appearing. The total duration of the disease is from four to six days. It is not serious, nor have any complications been noted. The conditions resembles measles somewhat closely and is contagious; children however are not more attacked than adults. [Could the condition be a variety of dengue?]

Beriberi. The natives of the Congo do not like rice and only consume it very rarely; this, according to the author, explains the rarity of beriberi. If on the other hand in the absence of manioc or maize Indo-Chinese rice is used, beriberi quickly develops. A small epidemic, from this cause, occurred at Brazzaville in May 1912.

G. C. L.

MASTERMAN (E. W. G.). Notes on some Tropical Diseases in Palestine.—*Jl. of Hygiene.* 1914. Apr. Vol. 14. No. 1. pp. 1-11. With 1 plate and 1 chart.

The paper forms a continuation of one published in the *Journal of Hygiene*, [see this *Bulletin* Vol. 2, p. 106].

Enteric fever, typhus fever, Jericho boil and ulcerative stomatitis are now dealt with, while there is a supplementary note on malaria. Typhus fever is probably a very much commoner disease in Jerusalem than has been supposed. It usually occurs during the colder months; in the past such cases have often been called malignant remittent malaria. A series of cases is described clinically. In these there was a typical crisis about the fourteenth day and in most there was a definite rash.

Jericho boil is a synonym of tropical sore. New-comers visiting Jericho during the summer months, especially during August and September, are very liable to acquire the disease. Residents having had it in childhood are now immune. The author himself on a visit in the hot season got half a dozen boils about his legs and arms.

He draws a distinction between Jericho boil and Aleppo boil; he believes that the lesions of the former are as a rule more superficial in character than the latter and do not lead to such deep scarring. An examination of skin sections for Leishman-Donovan bodies was not successful.

A form of ulceration of the mucous membrane of the mouth (ulcerative stomatitis) occurs commonly in children and young people, sometimes also in pregnant women. The lesions consist of elongated ragged ulcers with deep red edges and sloughy white bases, which form especially at the junction of the mucous membrane of the gums and that of the lip. A case is mentioned where the condition went on until it assumed the characteristic appearance of cancrum oris.

In the supplementary note on malaria a chart gives the results of blood examinations of fever cases attending the clinics connected with the English Hospital, Jerusalem, during a whole year commencing September 24, 1912. The most striking feature brought out is the entire disappearance of malignant malaria during the early spring. The few cases occurring in February, March and June are usually importations from the hot maritime plains or from the Jordan valley, where this form of the disease occurs at all seasons.

Dr. CROPPER informs the author that the list of anophelines quoted in the earlier paper (*loc. cit.*) is incorrect in that *Pyretophorus superpictus* was omitted, and that *P. palestinensis*=*Cellia pharoensis*.

G. C. L.

MAYNARD (G. D.). **Report on Prevalence of Pneumonia amongst Natives in their Tropical Habitat.**—*S. African Med. Record*. 1914. May 23. Vol. 12. No. 10. pp. 155-159.

The paper is a preliminary report and only deals with broad results and general impressions, a detailed discussion of the data collected being left to a later period. Cases of pneumonia were found amongst natives in their home areas, and a strain of organisms apparently identical with the pneumococcus was isolated.

On arrival in Salisbury the author was able to study the morbidity and mortality statistics of the native labour supply of Southern Rhodesia. A large number of interesting problems were determined, the most obvious of these being as follows:—

"1. By far the highest pneumonia rates occur amongst the natives recruited from Northern Rhodesia.

"2. The next highest rates are found amongst the natives from British Central Africa.

"3. The lowest rates occur amongst local natives, i.e., residents of Southern Rhodesia.

"4. The death rates from pneumonia in the various labour districts show considerable variations, even when corrected for the racial constitution of the populations.

"5. Large differences in the pneumonia rates are found from mine to mine, after due allowance has been made for the racial constitution of the populations.

"6. Speaking generally, the lowest death rates from pneumonia apparently occur on mines with a complement of under a hundred native miners. They become progressively and rapidly worse as the number employed increases to 300; at this point they fall to rise again as the number is further increased to 700. Mines employing over this number are so few that individual differences would overshadow any general rule which might otherwise be deduced. The death rates from "other diseases"

do not follow this rule, and apparently are unconnected with the number of natives employed, i.e., there is no obvious relationship between the rates and the number of natives employed.

"7. A very striking fall in the pneumonia rate has taken place in 1913. The pneumonia death-rate for all natives in 1912 was 19.4 per thousand, and in 1913 approximately 12.3 per thousand; this is a reduction of 37 per cent. The death-rate from "other diseases" has not exhibited a similar fall, being 11.4 per thousand in 1912, and 11.1 per thousand for 1913. This fall in the pneumonia rate has occurred in all the territorial groups of natives except in a small group of under 1,000 natives headed "others." The fall in the rate amongst Southern Rhodesian natives was 38 per cent., Northern Rhodesian natives 41 per cent., Portuguese natives 40 per cent., British Central African natives 29 per cent."

G. C. L.

SITSEN (A. E.). *Verslag over 173 Lijkopeningen, verricht aan de S. T. O. V. I. A. te Weltevreden.* [An Account of 173 Post Mortem Examinations.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1914. Vol. 54. Pt. 2. pp. 191-203. With 2 tables.

An account of 173 post mortem examinations made by the author at Batavia, Java, between November, 1909 and May, 1913. The causes of death are given in a table (Table I), at the end of the paper, the principal ones being as follows in order of frequency:

Croupous pneumonia, 26; Tuberculosis (including phthisis), 21; Amoebic dysentery, 10; Tumours, 7; Syphilitic affections of blood vessels, 6; Heart disease, 5; Peritonitis, 5; Beriberi, 5; Typhoid fever, 4; Septicaemia, 3; Non-syphilitic affections of blood vessels, 3; Cerebro-spinal meningitis, 2.

The remainder were surgical.

55 subjects were of European nationality, 45 being males and 10 females; 21 were Chinese, 19 males and 2 females; Javanese 96, 83 males and 13 females; and one Japanese, female.

J. B. N.

HEHIR (P.). *Ulcerated and Swollen Gums in Indian Troops.*—*Trans. xvii Intern. Congress of Med.*, London. 1913. Section xxi. Trop. Med. & Hyg. Part 2. pp. 121-123.

The condition described in the title is frequently associated with some denudation of the epithelium of the tongue and with a greater or less degree of oral sepsis. The pathological state is one of ulceration with suppuration of the margins and inner surfaces of the gums. It occurs chiefly during the hot summer and early autumn months when the men are run down from the effects of the hot weather or possibly from an inadequate supply of fresh vegetables. It is more common in Hindoos than in Mohammedans. It is not associated with dental caries. As a rule the men are unconscious of its existence. Unlike pyorrhoea alveolaris, it is in the early and intermediate stages curable by local applications. In the final stage a large area of the gums of both jaws is involved. The author writes that the condition tends to create a vulnerability of the mucous membrane of the alimentary tract to invasion by one or other strains associated with bacillary dysentery and epidemic infective diarrhoea. The state of the gums is similar to that sometimes seen in the incipient stage of land scurvy in the poorer classes in India. It may be a pre-scorbutic condition. The author has met with over 2,000 cases in the last six years.

A. G. B.

TROPICAL DISEASES BULLETIN.

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[No. 8.]

APPLIED HYGIENE IN THE TROPICS.

By COLONEL W. G. KING, C.I.E., I.M.S. (Retired).

REPORTS.

UGANDA PROTECTORATE (1913).*

Medical Section.—According to native returns, there was a decrease in mortality from communicable diseases as compared with 1912 to the following extent: dysentery 117, plague 144, sleeping sickness 224, smallpox 182. The Bukeddi special return is not included in this calculation; it notes 2,154 deaths from plague, against 1,659 reported in 1912. Syphilis accounted for 2,287 deaths and gonorrhoea for 1,669. Hospital returns showed the marked decrease of 1,01 cases.

Sub-Assistant Surgeon VASWANI died of plague after assisting at a post mortem of a case of that disease. His work is referred to by Dr. HODGES in the highest terms. In consequence of his loss, fewer inoculations with Haffkine's anti-plague vaccine were performed than in the preceding year. Plague "continues to be a source of anxiety in the Eastern Province."

The recent legislation treating syphilis as a "dangerous disease" is being put into execution tentatively and cautiously. The segregation of lepers in camp has not proved a success, and it is now suggested to segregate them in their own villages. It is not believed leprosy is on the increase. The following is a statement of important work fulfilled by Miss M. ROBERTSON, Protozoologist:—

"She reported in the Masindi-Buruli District the existence of a long trypanosome, morphologically of the *gambiense-brucei-rhodesiense* type. This trypanosome is without doubt conveyed by *Glossina morsitans* to dogs, producing an acute and rapidly fatal disease in which keratitis is often a marked symptom. It is a most important point for investigation whether this trypanosome is, or is likely to become, pathogenic to human beings, and special attention will be directed to this during 1914. At present, however, there is no positive evidence in favour of such a supposition, and the balance of evidence is against the conclusion that this trypanosome, or any of the other forms infecting cattle and game in the same area, is a new or recent introduction."

*UGANDA PROTECTORATE.—Annual Medical and Sanitary Report for 1913. [Principal Medical Officer, A. D. P. HODGES; Medical Sanitary Officer, C. J. BAKER.] Fcap. 1914: Printed by Waterlow & Sons, Ltd., London.

Dr. TAYLOR, Medical Officer, Entebbe, in the Appendix to the Report gives a description of bronchial spirochaetosis, which had attracted his attention prior to CHALMERS and O'FARRELL's paper in the *Journal of Tropical Medicine and Hygiene* of November 1st, 1913. He concludes an elaborate study of the cases which came under his observation with the following statement:—

"As many of the cases under observation may have been relapses, possibly a less potent and, therefore, less apparent exciting cause was required than was necessary to bring about an original attack. Stomatitis, pharyngitis, coryza and other respiratory diseases are very prevalent among the natives and others residing in Uganda, and more of these conditions may be found to be caused or complicated by spirochaetosis. Or, as is perhaps more probable, the lower resistance and suitable nidus provided by such conditions may allow parasites usually harmless to increase in numbers and virulence to such a degree that they extend down the air passages, and become of pathological importance." (See also this *Bulletin*, Vol. 4, p. 251.)

Dr. HODGES urges the important subject of allowing sufficient cubic space for prisoners in jail, and quotes the instance of Mbale, where the average cubic space per prisoner for sleeping purposes was only increased to 200 ft., notwithstanding alterations for relieving the crowded state of the jail.

Sanitary Section.—Dr. BAKER opens this section of the Report by stating that a sanitary inspector has been appointed for Kampala. This sounds a small matter, but in practical sanitation denotes the dawn of an era when applied hygiene will take the place of its theory. He notes with appreciation the advice given by Professor W. J. SIMPSON, chiefly on matters of town planning. It was held that the growth of the cotton industry in the plague endemic area represented a danger requiring early action, by the separation of cotton in warehouses and ginneries from the residential part of townships. On this ground it has been decided to reserve, as an anti-plague measure, a zone of 300 yards in width between the residential and manufacturing quarters; and, as an antimalarial measure, to reserve a zone of similar dimensions between Europeans and Asiatics. He notes, however, that in consequence of several plots of land having been granted on long leases and permanent buildings erected on them, difficulty in application of these needful rules is anticipated. Accordingly, SIMPSON "condemned the leasing of large plots to Asiatics with permission to sublet, a practice which has resulted in subdivision of the plots and overcrowding of the inhabitants."

In regard to plague, Dr. BAKER reports that the Acting Principal Medical Officer's suggestions, which were to the following effect, received the support of Professor SIMPSON:—

"*Measures to deal with plague in the endemic area.*—Principally:—

1. Increase of the present staff to the number of three Medical Officers, three Sub-Assistant Surgeons, and thirty-five Plague Inspectors.
2. Accurate reporting of cases as well as deaths in the endemic area.
3. The continuance of inoculation of contacts with prophylactic serum.
4. Rat destruction on a larger scale.

Measures for prevention of Plague in Towns and Trade Centres:—

1. The exclusion of cotton stores, markets and ginneries from townships.
2. The control of ginneries and stores by legislation dealing with siting and construction.
3. Establishment of Isolation Hospitals and Segregation Camps at Mbale, Jinja and Kampala, and a Segregation Camp at Entebbe."

Natives readily submitted to anti-plague inoculation. Vaccine both from Bombay and the Lister Institute was received. "The latter has the disadvantage of being supplied in large phials containing 21 doses, so that when only a few inoculations have to be performed at a time a portion of the serum has to be thrown away; it is reported, however, to have given better results than the serum from Bombay, and to have been less painful on injection."

The endeavour to incinerate night soil at Kampala is reported not to be so successful as expected, and "consequently a large portion of the night soil has had to be buried."

ZANZIBAR (1913).*

The man of curative medicine finds his reward—very often the only one—in seeing his efforts to save life and suffering demonstrated in the person of individuals snatched from death; the sanitarian counts his slower victories by communities and ultimately by provinces and countries. Hence, both at times indulge in retrospects which tell them of the rate of progress. Thus, we find that the Health Officer, Zanzibar, Major D. S. SKELTON, R.A.M.C., is able, in the introductory paragraph of his Report for 1913, to contrast favourably the present with past sanitary conditions. He states that in the mid-Victorian period "dirt, filth, and rubbish of all kinds was flung on the streets, and if one went out of one's house, one was compelled to wade through a dreadful mess. Dead bodies were cast out on the beach in many instances or, if the corpse were fortunate enough to be buried, the grave was dug anywhere in the town, whilst the richer and more important persons were buried in their own back gardens, so to speak." In contrast, he is able to show that, in the present day, complaints of insanitary conditions are freely brought to his office—a state of affairs he is only too glad to encourage.

To serve a population estimated at about 197,000, he states there was a total of 360 employees, amongst whom administrative duties were confined to four.

Financial conditions have prevented any "very striking work" being put in hand; still, Major Skelton is able to report that "a lot of quiet and exceedingly useful work has been done in clearing up and clearing away ruins by the Public Works Department." He, nevertheless, urges the great importance of "town planning" in Zanzibar. He advises early action in the case of dark and ill-ventilated huts of natives, where absence of light and the existence of "choos" in the kitchens favour the propagation of the *Culex fatigans*, with special regard to the fact that "at least 1 in 5 of the population of Zanzibar is infected with microfilaria." Moreover, a certain area of the town (which during his recent deputation to East Africa attracted the particular attention of Professor J. M. SIMPSON) "appears to be the focus of plague infected rats."

* ZANZIBAR PROTECTORATE.—Public Health Report for the year 1913. [Health Officer, Major D. S. SKELTON, R.A.M.C., M.R.C.S.]

Major Skelton, in discussing the vital statistics of Zanzibar, points to a matter of economic importance in the decreasing birth rate of the Swahilis. Members of that community are largely trusted to for "indigenous labour supply." He offers no theory as to the decrease, but points to the fact that communities of other tribes resident in Zanzibar show no similar tendency and, finally, suggests it may become necessary for Government to offer a "baby bonus" for Swahilis, as is done in Australia. He asserts that Indians in Zanzibar are not of the class which undertakes daily labour.

Major Skelton supports Sir Havelock CHARLES's opinion as to necessity for the European serving in the tropics being of a selected type, but considers that if this be attended to "no man who spends the best part of his life in Zanzibar, with its apparently not undesirable climate, need come to any great grief on this account."

The birth rate for the whole island for 1913 is said to have been 15.35, and the death rate 26.3. The infantile death rate was 140 per mille of registered births.

Beyond one case imported from Dar-es-Salam, there was no human plague in Zanzibar during the year. 51,000 rats were destroyed by poisoning and trapping. Fourteen rats were declared plague infected. In future, the Rodier system as well as rat poisoning will be pursued. Major Skelton here describes the method:—

"Catch the rats alive and uninjured; kill all the females and liberate the males, keeping a strict tally of the number; the tail of the male is snipped so that if caught again he can be counted out. The system appears to depend on the fact that rats have become a pest because they are polygamous, just as rabbits have in Australia. If they become polyandrous they will cease to be a nuisance, because as soon as the number of males exceeds that of females, the males will persecute the females and eventually they will worry them to such an extent that the female cannot breed. The male will also kill what young are born. Finally, there should practically be no females left and so the pest will cease. This is what has happened in the case of rabbits. The plan anyhow is worth trying."

A total of 22 cases of smallpox occurred, but wide spread was prevented by removal of both patients and contacts to Gulioni Hospital, vaccination of all house contacts, house-to-house search for cases, and disinfection of infected houses. Vaccination (nature of vaccine not stated) was not so successful as in previous years, which Major Skelton ascribes chiefly to an inferior strain of vaccine being employed.

Tuberculosis makes itself felt in the town population of Zanzibar, but the number of deaths from this cause shows a steady decline since 1910. Cerebro-spinal meningitis was prevalent amongst the Kikuyu in the highlands of East Africa. Quarantine of 14 days was enforced against the Kikuyu proceeding to Zanzibar via Nairobi. Major Skelton, as a result of experience gained at Mombasa, believes the disease cannot "flourish at the temperature we get at Zanzibar." As to the existence of filariasis, Major Skelton points to the importance of improved conservancy in that the cesspools and "choos" of the town offer breeding places for the *Culex fatigans*. He holds it is out of the question to oil regularly 3,000 and 4,000 cesspits in the town, and "as long as we have cesspits so long shall we have filariasis and its sequelae."

In regard to malaria prevention, it is stated that the barracks of the King's African Rifles are surrounded with swamps affording suitable breeding sites for anopheles. Major Skelton then suggests that no surprise will be felt at perusal of a table he appends. This gives the "fever" history of 24 officers and two ladies. If the case of one officer living in barrack quarters for 18 months and suffering from monthly attacks of fever be excluded from consideration, it is found that on a residence extending from two to nine months in the barracks 13 contracted fever and two escaped; the remainder lived in town and so were not attacked, so far as records existed. Of the total attacked three officers were invalided. No mention is made in the Report of any attempt at drainage in these particular swamps, or in any other part of the islands. After March, 1913, oiling by a "mosquito brigade" has been carried out in the town at a cost limited to £400 per annum. Judging by results to the end of the year, Major Skelton considers the method satisfactory.

The number of lepers in the island is estimated at 450. Of these only 268 are under control. Major Skelton enforces the inutility of such partial measures by stating that the various leper settlements cost in the aggregate Rs. 30,000 per annum—"money spent without getting very much in the way of returns." He advises concentration upon a selected island and the provision of treatment for lepers.

NYASALAND (1912-13).*

This Report opens with the statement that, although malaria still continues to be the chief disease among Europeans, severe attacks are becoming noticeably rare—a result which is ascribed to increased attention to quinine prophylaxis. There were ten cases of blackwater fever amongst Europeans against one Asiatic attacked. In all the eleven cases, there was a history of previous attacks of malaria. In the Ruo District, Dr. SANDERSON examined blood films of natives after 8 p.m. and found embryos of *Filaria bancrofti* in 27·8 per cent. In the positive cases, there was no accompanying elephantiasis.

In the "proclaimed area," the incidence of sleeping sickness upon a population of 1,500 adults was in 1910-11, 1·96; 1911-12, 1·62; 1912-13, 4·09 per cent. In a population of 3,000, the rates for the same years were respectively 1 per cent, 0·83 per cent., and 2·1 per cent. Dr. HEARSEY does not, however, accept these figures as conclusively showing increase of trypanosomiasis, as with increasing trust of European intentions by natives more cases are likely to exhibit themselves. He hence counsels further investigation; and especially indicates the desirability of examining the population of districts immediately adjoining the proclaimed area. After alluding to the fact that the Medical Officer in charge of sleeping sickness investigation at present is engaged "in mapping out the natural features of the country" so far as to facilitate clearing operations, he states:—"The clearings which have recently been made around villages in the area have been attended with the best results;

*NYASALAND PROTECTORATE: Annual Medical Report on the Health and Sanitary Condition of the Nyasaland Protectorate for the year ended 31st March 1913. [Principal Medical Officer, H. HEARSEY.] F^{cap}. 1913: Printed by Waterlow & Sons, Ltd., London.

Dr. CONRAN in his recent report stating that the cutting down of bush and scrub and the lopping of branches of overhanging trees had produced a very appreciable diminution in the number of flies from the immediate neighbourhood of these villages." Compared with the Uganda type, he holds that the disease is "uniformly progressive and rapidly fatal." Three cases of typhoid occurred in Europeans and two in natives.

In connection with the recent inspection of the Transvaal Mines by Surgeon-General GORGAS and the extent to which Nyasaland supplies labour for these, it is of interest to find that the men on return to their native country are being carefully examined—chiefly by Dr. OLD. Of 1,274 it was found that 3.01 per cent. were phthisical, and 9.5 were returned as "suspicious." Whilst no reason is found for disagreeing with the opinion of the "Medical Society of the Transvaal" that "tuberculous condition is accidental and only seen in a minority of cases," the highly desirable precautionary measure has been taken of warning Medical Officers and Residents to keep all cases under observation, having regard to the "lowered vitality of the damaged lungs in pneumokoniosis."

The first local case of dracontiasis was discovered in the case of a man of the King's African Rifles. The helminthic researches of Drs. CONRAN, STANNUS, BURY and SANDERSON show that in the various districts ankylostomiasis is present in from 16.8 to 40.4 per cent; schistosomiasis in 4.9 to 32.3 per cent. The importance of correct night soil conservancy in relation to ankylostomiasis is fully recognised, and the method advised by Dr. Andrew BALFOUR, in which both refuse and night soil are disposed of by incineration, will probably be adopted.

CYPRUS (1913).*

Special efforts have been made by the Chief Medical Officer to improve the accuracy of vital statistics as a step towards efficiency. He reports that the registering agency (Muktars) are being better paid than formerly. Whilst not claiming that accuracy has yet been secured, he considers the returns for 1913 are more trustworthy. In a population of 286,442, the registered birth rate was 29.4 and the death rate 18.8 per mille.

An impetus was given to anti-malarial work by the deputation of Sir Ronald Ross. Some anti-malarial action had, however, been taken previous to his arrival in obtaining a spleen census amongst children, and the free distribution of tannate of quinine. On the advice of Ross, the spleen census was largely extended so that a total of 18,981 children was examined. The total average spleen rate was 17.2; but the items indicate 1,542 and 4,383 children with spleen rates of 49.73 and 27.6, respectively. In Voroklein in Larnaca District and Spatharico in Famagusta District, a rate of 100 per cent. was found.

*CYPRUS.—Annual Medical Report for the year ending 31st December, 1913. [Chief Medical Officer, R. A. CLEVELAND.] F^ocap. 1914: Printed by Waterlow and Sons, Ltd., London.

Five "probationary Sanitary Officers" were trained for anti-malarial work. Larvicides were freely employed. "Drainage of certain swamps and marshy places was carried out" in the Limassol and Larnaca Districts, but the chief efforts were confined to the towns and their neighbourhood. It was found that, judging by attendance of patients at Government Dispensaries, there was a decline of malaria fever cases from 10,035 in 1912 to 7,342 in 1913. Dr. CLEVELAND places no stress on these figures, as meteorological conditions might well have dominated the result. Yet he holds that when the figures for towns where the chief efforts were made are considered, there is reason to believe that notwithstanding the short interval between the inauguration of efforts (March) and the close of the year, they have been efficacious. Thus, according to the Dispensaries record in the towns, the malaria cases for 1913 were 4,356 against 5,819 in 1912.

Twenty-five cases of epidemic cerebro-spinal meningitis and 21 cases of diphtheria were under serum treatment during the year. Typhoid fever cases decreased from 447 in 1912 to 338 in 1913. The prevalence is ascribed to the consumption of water from unprotected shallow wells.

CEYLON (1912-13).*

The population of the Island, according to the 1911 census, was 4,106,350; as estimated on July 1st, 1913, it was 4,220,459. The birth rate was 36.2 and the death rate 28.7 per 1,000. On the estates, where 507,189 unindentured labourers were employed, the birth rate was 35.4 and the death rate 39.3 per 1,000. The chief causes of death amongst labourers and their families were dysentery (3,038), diarrhoea, pneumonia (1,688), ankylostomiasis (1,586), infantile convulsions (1,305), phthisis (235).

There was a decrease of 81,182 patients treated for malaria in the hospitals as compared with the previous year; but there was a severe outbreak in the Western Sabaragamuwa and Central Provinces. Of quinine 109,942 ounces were issued from the Civil Medical Stores, at a cost of Rs.66,766. On the estates quinine is issued free of cost; in several of these sanitary improvements have been effected. In the Island generally, the average spleen rate in 96,115 children under 15 years of age was 25.74 per cent. Kala azar is reported to exist "to a very slight extent."

Beyond the issue of quinine through village headmen and to schools, no very earnest anti-malarial effort seems to have been made by the public authorities, and Sir Allan PERRY concludes that, although "a slight decrease in malaria has been recently noticed in the majority of the provinces, this is more apparent than real." He records that the Kurunegala campaign has not been continued; that in Badulla "by methods of a small gang of labourers operating as a mosquito brigade the town has been largely freed from mosquitoes"; and that "a number of additional wards were fly-proofed in hospitals."

*CEYLON.—Administration Reports, 1912-13. Part 4.—Education, Science and Art. Medical. [Inspector-General of Hospitals, Sir Allan PERRY, M.D.]

He, however, sounds a more hopeful note by adding to this summary of anti-malarial measures: "The Sanitary Branch of a Department which had just begun operations before the end of the period will, in addition to their own staff, work through the already existing machinery."

Testimony is borne to the great value of Sir Leonard ROGERS's "discovery of emetine in the treatment of amoebic dysentery." The disease is said to be prevalent all over the island, "particularly in the planting districts." This is ascribed to the use of shallow and unprotected wells as sources of water supply. As to ankylostomiasis, it is held that "the lack of a conservancy system is one of the chief factors in the spread of the disease." Elsewhere it is stated that of the many sanitary errors "defective conservancy stands out pre-eminent." This important question is thus summarised:—"As satisfactory system of conservancy, the domestic pig and cesspits are not only worse than primitive, but create new foci of disease dissemination which would not otherwise occur." Anti-tuberculosis action has received much support in the gift of a sanatorium by Mr. A. E. De SILVA, at a cost of Rs.60,000.

THE BAHAMAS (1913).*

The Chief Medical Officer, with the object of training a newly-appointed Sanitary Inspector as well as gaining first-hand knowledge of conditions in Nassau, undertook a house-to-house inspection in a central portion. He inspected 466 houses. As to water supply, he found the people dependent on dug wells, "few of which were properly protected from surface pollution or from mosquitoes." In 20 per cent. of these wells mosquito larvae were found, those from which water was drawn by buckets being less subject to infestation than those having imperfect covers and pumps. In quality the water is hard and polluted. Tanks and underground cisterns for receipt of rain water were employed, but the majority were very dirty and imperfectly mosquito screened. *Culex fatigans* and *Stegomyia fasciata* were well represented. Natural holes in rock were not found to be favourite breeding places for mosquitoes, and "the presence of tadpoles seemed to be the explanation of the scarcity." Dr. McHATTIE has seen the tadpoles devouring larvae, and is of opinion that the "seasonal variation in the number of tadpoles probably accounts largely for the greater prevalence of mosquitoes at one time than another, other conditions such as the amount of rain, etc., remaining the same." He ends this section of his Report by a strong plea for not allowing "considerations of economy" to stand in the way of effective action being taken against the *Stegomyia fasciata*, in view of the possible incursion of yellow fever and the disastrous influence on local commerce and the position of Nassau as a winter resort. So far no anopheles mosquitoes nor larvae have been found, but a blood examination shows that true malaria exists; further search for these will be made.

*BAHAMAS.—Annual Medical Report for 1913. [Chief Medical Officer, A. C. N. McHATTIE.]

The privy pit is commonly used in the backyards of houses, and as these are small and the houses much crowded together the condition is "deplorable." Cesspools are also employed, many being converted wells. These are in porous rock 8 to 10 feet deep. The porous condition of rock has tempted some of the people to indulge in water-closets, notwithstanding the absence of a sewerage system. These closets are made so as to be flushed into the cesspools. These are universally condemned "as a menace to the health of the community," and Dr. McHattie now requires, as a condition for the use of water-closets, that the cesspools employed be rendered water-tight and be trapped and ventilated. But, recognising that the employing of these improved cesspools remains a problem, he urges either "the aid of a proper suction apparatus or the laying down of a proper sewerage system." He adds: "Not only would the w.c. drainage be rapidly carried away, but also the drainage from bath wastes, kitchen sinks, etc., which now frequently finds its way into the surface drains at the sides of the streets, giving rise to constant complaints of nuisance. These surface drains are only intended to carry off storm water, and with their uneven bottom and slight gradient are quite unfitted for the reception of dirty water." He pushes home his arguments as to this unsatisfactory state of affairs by inviting attention to the fact that "the recurrence, year after year, of sporadic cases of typhoid fever should be taken as a warning, which cannot be neglected indefinitely." Happily, he is able to look forward to the possibility of a pure water supply as the subject is under investigation.

Besides his personal inspection and practical recommendations founded thereon at Nassau, Dr. McHattie made a tour of inspection extending over a month in the small islands of the Colony. His Report should be of particular utility to the civil authorities concerned. He ascertained that in one area there had been no vaccination for 10 or 12 years, in another that the "Local Board of Health" has never assembled for 25 years. At two meteorological stations, he discovered that the methods of measurement of rainfall were absolutely erroneous. In another area he found that a medical officer—"the ex-officio Chairman of all the Local Boards"—was expected to visit out-stations, but was given no travelling allowance, with a very natural sequel of this duty being held "impossible." The sanitary condition of schools and conservancy arrangements of these and of certain private dwellings were radically bad.

TRINIDAD AND TOBAGO (1912-13).*

The mean population at mid-year of 1912-13 was estimated at 336,887. For statistical purposes, this is divided into the "general population," 228,114, and the "Indian" (here known as East Indian), 117,283. The birth-rate was 34·16 per mille, the death-rate 30·3.

*TRINIDAD and TOBAGO.—Report by the Surgeon-General on the Medical Department for the year 1912-13. Fcap. 1914: Printed at the Government Printing Office, Port-of-Spain.

"Infant mortality shows a heavy increase on the figures for the previous two years, the rate per 1,000 births being 202 compared with 149 and 148 in the last two years respectively. Children under five years of age died to the number of 1,520 and the total child mortality of 3,886 out of 10,295 deaths at all ages is a disquieting proportion equal to 37·9 per cent. of the total deaths, which means that out of every 100 deaths in the colony within the year nearly 40 were deaths of children under five years of age. This heavy annual charge upon population increase constitutes one of the most serious of the problems that affect the economic development and the material progress of the Colony. The figures are not available for referring the relative proportions of these deaths of young children to the general and the East Indian divisions of the community respectively."

Epidemic dysentery prevailed in seven medical districts, "especially in Chaguanas and the Naparimas, where a virulent type of the disease prevailed and mortality in the early stages of the epidemic was high." Enteric fever was also "usually prevalent" in some districts. The Surgeon General considers that the information obtained as to sanitary environment and general conditions is seldom of much value in etiological respects. "It is worthy of note, however, that there is a public water supply under exclusive control of the authority who supplies it in four out of the six districts where enteric fever prevailed to an unusual degree this year, namely, in Port-of-Spain, St. Joseph, Tacarigua and North Naparima."

Malaria is of a benign type, but is considerably in evidence. Quinine prophylaxis has been adopted in a "desultory fashion" by certain of the estates, whilst the cisterns and wells of Government buildings are screened. The Medical Officers of six districts report increase of ankylostomiasis. There have been no cases of plague since 4th July, 1912. Continuous measures are maintained against the *Stegomyia* and no yellow fever cases have been reported. 2,000 cases of yaws were treated with salvarsan, "without any ill effects."

At the close of the year, the West Indian Intercolonial Tuberculosis Conference was held in Trinidad. "There were 18 delegates from the West Indies and British Guiana and neighbouring countries, and Dr. Cecil WALL was accredited by the Secretary of State as the delegate from Great Britain." A bright future is looked forward to if the recommendations of the Conference are put into operation.

The Port Health Officer, Dr. C. F. LASSALLE, had apparently a busy time during the year, as 435 vessels and 4,331 packages of passengers' baggage were fumigated; also, 13,363 passengers and 9,184 members of crews were inspected on arrival. 3,470 persons were placed in medical surveillance, and there was a total number of 12,843 "presentations for medical supervision."

The tables attached to the Report show that of 14,215 rats bacteriologically examined, two only were found plague infected. Their examination was conducted between the 1st April, 1912, and the 13th March, 1913. During the same period, there were 11 cases of human plague in various localities.

ST. KITTS, NEVIS AND ANGUILLA.*

St. Kitts has a population of 26,283, Nevis of 12,945 and Anguilla,

*Medical Report on the Sanitary Condition of the Presidency of St. Kitts-Nevis and the Island of Anguilla, Leeward Islands Colony [Senior Medical Officer, M. H. FRETZ, L.R.C.P., L.R.C.S.]. F^{cap}. Printed by the St. Kitts Printery, St. Kitts, W.I.

4,075; their respective death rates in 1913 were 30·9, 28·5 and 18 per mille. Leprosy and yaws are specially noted as occurring, but beyond the fact that 61 cases of leprosy were in the Leper Asylum there is nothing to indicate the extent of prevalence. Syphilis, it is stated, is very prevalent, seriously affects the vitality of the population, and constitutes a social danger. The salvarsan treatment of yaws and syphilis is trusted to. Dr. Edward BRANCH reports a case of tertiary syphilis complicated with elephantiasis where improvement of the latter condition was marked after treatment by salvarsan.

BRITISH GUIANA TUBERCULOSIS REPORT.*

The Colony of Guiana eminently deserves the qualifying adjective of British. Those who have followed its struggle to develop its resources and to remove the impediment of imported labour being subjected to insanitary conditions, must recognise its determination not to "go under." It is not therefore surprising to find that the Society bearing the above title is able to state that the recommendations of the West Indian Intercolonial Conference on Tuberculosis of 1913 have been anticipated in British Guiana:—

"The Society has pleasure in reporting that all these measures were in force during 1913. Notification of tuberculosis patients has existed for two years, the establishment of a tuberculosis dispensary was accomplished seven years ago, excellent bylaws regulating the milk supply have been enforced for a year; the elements of sanitation and hygiene have been taught in the schools for four years, registration of births and deaths has been accomplished for over 30 years.

"Housing reform is particularly referred to, and the attention of the municipality of Georgetown was especially directed to this matter during the year. In consequence 565 premises have been dealt with."

The Report claims attention to the reduction of mortality shown in the Colony between 1907 and 1913. The phthisical death rate per 1,000 of population was in successive years of the period 2·7, 2·3, 2·3, 1·9, 1·3; the last figure "approaches within measurable distance of England, in which country the rate is 1·1 per 1,000 persons living."

*BRITISH GUIANA.—The British Guiana Society for the Prevention and Treatment of Tuberculosis. Seventh Annual Report. 1913.

DISEASE PREVENTION.

MALARIA.

North Carolina.

The following extracts from a Report of a sanitary survey in North Carolina by H. R. CARTER,* Senior Surgeon, United States Public Health Service, are of utility in giving practical support to more or less accepted anti-malaria measures. In reference to increased prosperity of the people concomitant with decrease of malaria and consequent increase of energy, it is stated:—

"They have cleaned up and drained more land, and it is kept for economic reasons freer from standing water and brush, hence of breeding places and shelter for mosquitoes. Surface wells have been replaced very generally by driven wells and pumps. Much stress is laid on this latter change by the physicians of this section. That these wells would furnish shelters for mosquitoes is certain. . . . Something must be said about the top minnows, which in my opinion are most valuable allies to the sanitarian in his anti-malarial campaign. They are found all over tide-water (North Carolina), and in myriads. They are not only in every stream of running water, no matter how slowly it runs, but in a large number of pools—big and little—which have no effluent. There are no larvae found if they can get at them. Unfortunately they do not penetrate thick grass, and the edges of streams harbouring this fish will sometimes show larvae. . . . It is an error to put fish that grow large, I mean such as will eat the minnows, in ponds and streams as a protection against mosquitoes.

"All the towns I visited in the tidewater section, except Plymouth, have a rather wide fringe, from 150 to 300 yards and more, of negro houses between the residences of the whites and the marshes which lie on their outskirts, and I am inclined to think, in spite of the number of carriers among the negroes and the opportunity this gives for infecting the *Anopheles*, that they, the negroes, are a protection to their white neighbours more distant from the breeding places; that very many *Anopheles* stop at the nearest blood food available. This question, of course, has not been worked out, but the mill tenements rarely have such a fringe of negro houses, and are reported to have decidedly more malarial fever than other whites in towns so protected, even when about the same distance from the marshes. This disposition of the houses of the races comes from the lower rents of houses next to outskirts, due probably to their being more unhealthful to whites†. . . . Where available, waste from the dye plants of cotton mills was recommended to be turned into ditches and streams. If turned into a marsh it does little good unless the marsh has been drained into an effluent ditch. Even the wash water from negro laundresses, living as they do thickly on the outskirts of towns, is of value in the adjacent ditches. At Edenton and Fayetteville two otherwise difficult ditches have been rendered safe by dye waste and at Washington one by the discharge of gas tar into it. . . .

"Also, as malaria lessens prosperity increases from the increase of energy and strength of the people, and with increased prosperity come land better cleared and better drained, better living, and better hygiene generally, especially that against malaria, another endless chain for betterment in anti-malarial work. . . . Although the elimination of the mosquito is the method of election in an anti-malarial campaign where practicable, yet I believe the prophylactic use of quinine is capable of much good. . . .

*CARTER (H.R.). Malaria in North Carolina.—*U.S. Public Health Reps.* 1913. Dec. 19. Vol. 28. No. 51. pp. 2739-2760.

†This observation contrasts with the usual belief that the propinquity to "whites" of races less observant of health requirements favours spread, amongst other diseases, of malaria. Evidently, as stated by Senior Surgeon Carter, although the evidence is suggestive, a decision cannot yet be arrived at.

"I demonstrated *Anopheles* larvae in various places and made a complete survey of the town. I found here a number of collections of brown water, with a slight taste of tannin, in which I found no larvae of either *Culex* or *Anopheles*. There were many breeding places, however, elsewhere, especially in the pools in the ditches. In one place about 50 *Anopheles* larvae, full grown, and some as pupae, were found in what was really thin mud, the water having evaporated to the consistency of sirup. . . . I remained over four and one-half days in all at this place, to talk over the plans for its sanitation with the mayor, health officer, and the different mill owners and help them formulate plans for co-operation in this work. They all agreed, and it is unquestionably true, that the lessened loss from sickness and the increased efficiency which will result from eliminating or nearly eliminating malaria here will justify a considerable expense. That the mayor is an engineer, and that the mill owners are business men, used to investing money for the sake of getting returns, makes the prospects good for results here."

The Panama Canal.

The Report of the Department of Sanitation of the Isthmian Canal for December, 1913, shows in chart form the rate of decrease of malaria "as an index of practical anti-malarial operations." The chart is stated to have been compiled "by adding monthly percentages of force sick with malaria." The rates are:—

Years.	Per cent.	Years.	Per cent.
1906 ..	82	1910 ..	19
1907 ..	43	1911 ..	19
1908 ..	28	1912 ..	11
1909 ..	22	1913 ..	8

Algeria.

Dr. HYBRAM (*Campagne anti-paludique de 1912*, Gouvernement general de l'Algerie) reports that in Dour Ain Khiar the native school is situated on a slope in the neighbourhood of a marsh. Both *Culex* and *Anopheles* are found in swarms. Screening and quinine prophylaxis had been advised by the local Medical Officer in 1908. He reports completion of screening of the school and the house of the schoolmaster in 1909. Special arrangements were made to treat the scholars with quinine during their holidays. The total period of observation extended from May, 1912 to January, 1913. He personally directed the number of tablets of quinine each scholar should take, leaving however to the discretion of the quinine distributor to increase or diminish the dose according to the necessities of individual cases. Quinine was administered three times weekly. When two tablets per day were administered, one was given in the morning, one in the evening. In 79 scholars observed, 28 possessed enlarged spleens (seven of which were very large), 12 were cured, 11 were practically cured and five exhibited no change.

In the same volume there is exhibited a general enthusiasm by the reporting officers as to the advantage of quinine prophylaxis. For example, D. CARREGA states that at Penthièvre, whilst in the autumn and winter of 1911 attacks of fever were both numerous and severe, in 1912 there was an abrupt and long sustained cessation of cases. The various measures of prophylaxis were much relaxed; they consisted of some works of drainage and rough canalization of marshy lands, without the aid of oiling. Individual prophylaxis by quinine was alone pressed in respect to scholars and 145 natives.

In the editorial notes (*Etudes épidémiologiques*) on the various reports, however, attention is drawn to the fact that the winter of 1911-12 was exceptionally dry, and that during 1912 there was a diminution of mosquitoes. Nevertheless, in two areas the opposite was the case. At Maison Carrée, owing to the level of the Harrack river having fallen, the number of pools of stagnant water on its banks was more numerous than in preceding years. In these pools larvæ-eating fishes are rare, though common enough in the stream itself. Similarly, the water level at the barrage of the Fergoug river having fallen, stagnant pools were formed in the mud, where the breeding of the mosquitoes proceeded uninterrupted by the fish confined to water of the barrage.

Much attention has been given at Mondovi to the question whether the area near the railway station is subject to invasion by mosquitoes imported by trains passing through infested regions. It was found that the trains traversing the marshy tracts in the neighbourhood of the lake Fitzara are invaded in the early morning and at twilight by swarms of *Anopheles*, and that these are often transported in the waggons for long distances.

Treatment of Swamps.

Dr. WATKINS in charge of the Pemba Division, Zanzibar, makes the following statement showing how the valuable method of "oiling" as an anti-malarial measure may be discredited by failure to discriminate phases of applicability:—

"Kerosining swamps is really a useless expenditure. This may seem an absurd statement, but if the facts be borne in mind, that in no case is a single swamp properly channelled or graded, its truth is obvious; for every shower washes out the contents of the puddles and makes them ready for the next brood of mosquitoes. Until some systematic attention is given, it is useless, unless the general health of the community can be really benefited, and the money spent at present is a sheer waste."*

Anti-Malarial Works in India.

In their Resolution on sanitary administration of the 23rd May, 1914, to which reference is made under "Sanitary Organisation," the Government of India indicate that besides encouraging the use of quinine by populations and minor anti-malarial methods, they advise that "notwithstanding the initial expense, those anti-malarial measures should be chosen which will act automatically, be independent of outside help and permanent in their effects." Presumably, under this comprehensive definition, the wide employment of major and minor sanitary engineering works for the relief of surface and subsoil works is contemplated. The Sanitary Commissioner for the United Provinces, India, is thus able to state in his Annual Report for 1913 that anti-malarial permanent works are now in progress in Saharanpur Nagina and Kosi. The results that may be achieved will be of great sanitary interest. Surgeon-General Sir Pardey LUKIS, I.M.S., at the last All-India Sanitary Congress, quoted an illustration of the efficacy of the policy now contemplated by pointing to the good results of old

*ZANZIBAR PROTECTORATE.—Medical and Sanitary Report for the Year 1913. p. 60.

drainage works at Merut. In the King's speech at the Delhi durbar, reference was also made to drainage of a marsh in the neighbourhood of the city, which has been effected as an anti-malaria measure. As an illustration of work of former days in India may be stated the case of Kampti, where in 1829, in response to an urgent requirement for action by the Secretary of State, drainage of a swamp in front of the European Infantry and Artillery Barracks at that place was recommended by a Committee, and duly carried out. At that time in Kampti the European troops sick admission rate was 239 per cent. ! The result of the drainage was fully satisfactory. The Honourable East India Company had no hesitation in recognising the utility of works, destined for irrigation, being so constructed and administered as to favour correct disposal of surface water and prevention of interference with subsoil water, with the object of preventing the propagation of malaria. On the advice of the Dempster Committee in 1845 that Government sanctioned, *in sanitary interests*, a sum of one and a half millions sterling as an addition to the estimate for the then contemplated great Ganges Canal.

Malaria and Irrigation.

It has long been recognised that large areas in tropical countries are under irrigation without malaria following in its wake and, on the other hand, that its introduction may be followed by intense malaria. The "why and wherefore" of the difference may depend on local factors yet unexplained; but the writer, speaking from experience of both malarious and non-malarious areas under irrigation, suggests that a study of the question is not likely to bring forth important unrecognised factors, but rather a decision as to which of those already recognised happens to be predominant in a specified area.

The following is a recent instance of malaria following irrigation, as stated by Lt.-Col. C. E. WILLIAMS, I.M.S., in the Report of the Sanitary Commissioner with the Government of Burma for 1912 :—

"Enquiry elicited the information that ever since the Môn Canal was opened for use by the agriculturists of the district in July 1911, mortality has been increasing in the area served by it. . . . There can I think be little doubt, after a study of the mortality returns of the district for the two years under consideration, that the spread of malarial infection of a virulent type was directly associated with the extension of irrigation in the district. . . . Investigations carried on in December and January disclosed the fact that the vast majority of the children in the infected villages had enlarged spleens, and a spleen rate little short of 100 per cent. was frequently met with even as late as the end of January. Adults examined by me in January rarely showed an enlarged spleen. . . . Many adults succumbed to the disease, which was in a number of instances accompanied by symptoms such as dropsy and loss of power in the leg muscles, accompanied by loss of reflexes, suggestive of beriberi."

YELLOW FEVER.

In the *U.S. Public Health Bulletin*, No. 64, of February, 1914, rulings on "Quarantine Procedure to aid masters of vessels in complying with the United States Quarantine Regulations" are set forth. In language devoid of technicalities, methods are laid down as to procedure before arrival in port of vessels having on board cases of plague, cholera, yellow fever and smallpox. The chief point of interest in

the brochure is, however, a map of the world on which are shown, from statistics available in the U.S.A. Public Health Office, the various localities affected with plague, cholera, and yellow fever between 1909 and 1913.

This map shows in a manner more definite than much writing could secure how widespread plague has become since it started on its world-wide tour in 1894 from Hong Kong. Yet in the "seventies" it was customary to quote this disease as conquered by improved hygiene!

In a note on this map it is stated "the yellow fever mosquito is found nearly everywhere, but especially between 38° N. and 38° S. latitudes." This area is defined by curves. In reckoning possibilities of yellow fever extending to India, some criterion can be gathered from occurrences during the period 1909-13. The possibilities are obvious; the probabilities, which must depend on the multiplication of possibilities by trade facilities, are, however, of a consoling nature. Thus, on the West Coast of Africa, yellow fever occurred at Bathurst, Freetown, Sekondi, Lagos, Forcados.* In this connection, it is noteworthy that "for all practical purposes" Hong Kong maintains no *Stegomyia fasciata*, it being held that, although "there has been ample opportunity for *Stegomyia fasciata* to arrive and establish themselves the results of the search, so far as it has gone, show that they have failed to do so" (p. 160, *Report of the Advisory Committee for the Tropical Diseases Research Fund*, for 1913). In a report dated the 6th March of the present year, the Government Bacteriologist, Hong Kong, states that up to that date "two separate samples have been found widely separated from each other in the City of Victoria."†

KALA AZAR.

At page 363 of a recent Sanitation number of this *Bulletin* (1914, No. 7, Vol. 3), the question was discussed how far sanitary conclusions could be based upon a paper by Lieutenant-Colonel Sir Leonard ROGERS and Dr. J. DODDS-PRICE as to results of segregation measures for kala azar. In the *Indian Medical Gazette* for August of this year, under the title "Segregation and Kala Azar, a useful Measure," Major W. McCOMBIE YOUNG, I.M.S., Deputy Sanitary Commissioner, Madras, shows that from 1909 onwards successful action has been taken in respect to the civil population by placing at disposal of the healthy in infected areas houses "built upon a new site at a minimum distance of 50 yards from the old site, and in many cases at a quarter distance." The old houses and all apparel and articles liable to shelter parasites were burnt—compensation being given by Government. In his statement, the same blanks as to sanitary conditions of the respective new and old infected sites are found as in the paper by the first mentioned authors, so that, in the presence of conflicting theories as to causation, it is impossible

*On the East Coast of Africa, Kisumu, Mombasa, and Nairobi are also, by a mistake at the hands of the printer, credited with cases of yellow fever. In so complicated a mass of statistics there was plenty of room for such slips. It was recognised and corrected by the Bureau of the U.S.A. Public Health Reports of January 9, p. 88, and of June 26, 1914.

†In a recent Report from Dr. Harold MACFARLANE, Government Bacteriologist, it is stated that *S. fasciata* has been found in 53 places in Kowloon in 1914, and three times in Victoria.

to conclude which is supported by the evidence now recorded. A noteworthy difference from ROGERS and DODD-PRICE's methods is, however, mentioned, in that no scruple was felt in allowing an infected member of the family to accompany the healthy members to the new site, with the provision of a separate sleeping-room and advice that the infected members should not have their meals with others. Such advice given to members of a free civil population *might* be adhered to, but the chances are, the writer thinks, much the other way. Nevertheless, the result of the advice is thus summarised:—"Of forty families removed to new sites three years ago, a recurrence of the disease in a person not obviously infected upon the old site has occurred in only one case."

In a review obviously devoid of bias the author claims that, whatever view of the matter be taken, "site infection" appears to play an important part in the propagation of the disease, and advises "further attention to the apparent usefulness as a public measure of the removal of infected families to new houses in uninfected sites." The issues are thus narrowed, leaving the case typically one in which sanitarians aided by field laboratories should, in the interests of sanitary research, investigate the subject on the spot, as contrasted with the confining of attention to clinical laboratories, where the effort to construct a scientific curative treatment is apt to over-shadow the public health aspects of the enquiry.

PLAGUE.

Destruction of Rats.

The Rodier theory, which is referred to in the preceding pages in the abstract of the Zanzibar Report by Major SKELTON, is of course very "neat"—the sequence of events expected is definite. Before, however, applying it to an important part of an anti-plague campaign, as suggested in Zanzibar, it would be well to ascertain whether the theory and facts are in accord as to rabbits and, if so, whether they are equally applicable to rats. Taking New South Wales, within which area Mr. RODIER tried his scheme, as reasonably representative of Australia, it cannot be said that his theory as to rabbits has stood the test of practice. In the *Agricultural Gazette of New South Wales* of July 2nd, 1890, is recorded the results of a carefully conducted experiment by James D. STEWART, M.R.C.V.S., Government Veterinary Surgeon. Rabbits were duly observed in pens under the conditions required by Mr. RODIER. In a summary he states:—"1. The preponderance of males tended to decrease the number of young. 2. The males when in excess did not worry the females to death. 3. The males did not worry each other to any great extent."

In his "Comment" on the subject, after attending to the theory of "cross heredity of sex"—"the doctrine of which is that the better nourished and superior parents tend to produce the opposite sex"—he adds: "It is therefore obvious that, unless extensive destruction of females is continuously carried on, the sexual balance soon becomes restored. . . . It would appear that the method . . . entails prolonged and continuous destruction of females, while the chances of ultimate success seem to rest in a pertinacious effort to take the last doe."

Some idea of the length of time required for this pertinacious effort under favourable conditions, viz., the use of wire fencing, which should greatly diminish the chances of entrance to an area of fresh rabbits, is afforded by a Report in the above mentioned *Gazette*, dated the 2nd August, 1906, by Mr. D. W. HATTON, Government Stock Inspector, Bourke. This official visited Mr. Rodier's farm and, after careful inspection, concluded that any success obtained was due not to Mr. Rodier's special method, but to the energetic use of a special form of trap the owner had devised. Mr. HATTON points out that the system has been in use for 15 years and that, so far as Mr. Rodier's own farm is concerned, there is no extermination of rabbits.

In a Table supplied in the Zanzibar Report showing the number of rats trapped, females are more than two to each male. In a similar table in the Trinidad and Tobago Medical Report for 1913, the females constitute 63·4 per cent. of the total rats caught. Polyandry, upon which Rodier depends as inimical to fecundity, may be a normal condition in rats, but would have to be very pronounced before inimical effects could be looked for. But in Zanzibar, side by side with trapping to subserve the Rodier system, poisoning is to be conducted, so that a considerable element of uncertainty as to proportion of the sexes would be introduced. Again, trap-shyness is readily induced amongst rats and, after a certain number of males were freed, it would argue ill for their well-known intelligence if the rats of any locality agreed to being caught a second time. On the whole, in the interests of plague prevention, the writer would prefer to adopt more direct and quicker means than a trial of the Rodier system.

Rewards for Rat Destruction.

Dr. E. A. CHARTRES suggests with reference to offering rewards for rat destruction "there need be no fear that any West African native will take up rat culture for the sake of the small reward—one penny for each rat." He, of course, speaks from personal knowledge of the people locally concerned; but it certainly would not be safe to generalise that culture of so prolific an animal with prospective rewards at that sum would not tempt trading instincts of some races. At any rate, culture is not the only danger in offering rewards. The writer has known rats to be imported for rewards from beyond the infected areas. This, in a sense, might be of public benefit, but upsets calculations as to diminution of the local rat population; whilst it is hardly satisfactory for the local authority of a town to find it is paying for rats from rural areas. In one area known to the writer, it was ruled that the tails of rats should be produced to claim reward. One man was particularly energetic. He repeatedly brought in neat bundles, each of a dozen tails, by the cartload. These were duly paid for to the extent of 35,000 tails. An inquisitive officer one day opened some of the bundles, and it was then found that a proportion of the tails were made by turning rat skin, with the aid of an adhesive, round piece of appropriately shaped bamboo; one rat besides the normal tail afforded skin enough to make an extra three. Indeed, if a reward is big enough to induce anyone to bring a rat to a dépôt, the chances are always that, unless exceptional populations are dealt with, some

speculative methods may be excogitated, and general experience therefore points to the advisability of rat destruction methods being, in the interests of efficiency and economy, controlled entirely by public servants, if the people offer no opposition.

Lieut.-Colonel T. LANE, I.M.S., recommends (*Indian Medical Gazette*, 1914, Aug., p. 322) the following method of both rat and rat-flea destruction:—"I have been trying to simplify the smoking of rats for some time past and I have ultimately invented this little packet or 'plague *pataka*.' It is really a little chemical 'Agenti,' which burns in a space no matter how confined and at the same time burns neem leaves and a little chillis. The method of using it is to set it on fire, insert it into the rat hole and block the hole with mud." Those who would wish to try this method and cannot secure "neem" (*Melia azadirachta*) leaves need not, the writer suggests, hesitate in substituting other forms—although the selection of the "neem" by Lieut.-Colonel LANE is judicious for several reasons.

Control of Rats.

Much effort in plague epidemics is ordinarily made to destroy rats. To control their movements also has its advantages. Previous allusion has been made to the excellent Japanese system of surrounding the first houses infected with plague—or suspected plague—with corrugated iron sunk to a depth preventing escape of rats by burrowing. But obviously there is another phase of the matter. In dealing with houses before they can be mechanically rat-proofed, how is entry of possibly infected rats (after disinfection has been carried out) to be prevented and the spread of rats to be controlled? The writer has used with advantage a method which was communicated to him by the manager of a sugar factory, who had, after great loss by rats, found this measure protective—namely, the use of acid tars fortified by commercial sulphuric acid. After successful experiments kindly conducted for him by Dr. MARSHALL, D.P.H. (now Assistant Health Officer, Rangoon), the writer in 1900 advised the method for general adoption in the Madras Presidency. By its use it undoubtedly is possible, by a single application, to expel rats and to prevent the return of rats into formerly used holes, for a space of time varying from a fortnight to six months. The combination, apparently as a result of efforts of the rats to rid the skin of the irritating sticky mass with the mouth and feet and incidental ingestion, has some feeble killing power, but is not to be relied on for this purpose.

The method of employment is to mix the commercial sulphuric acid and tar (1 to 9) in an earthen vessel *at the time of use*. The mixture evolves slowly, but for a prolonged period, irritating fumes. If this be placed by means of wooden spoons at the entrance of all rat holes in the neighbourhood, what with the difficulty of getting out of the burrows and being attacked within it by fumes, rats have a bad time, and do their best to leave the place. Placed in a house along known rat runs, protection for this particular portion can be gained. The method has proved of great protection to persons compelled to live in houses in the midst of plague infected areas. If a continuous ring of the mixture be placed on the soil, granaries, markets, etc., can be kept free of rats. At the opening of a campaign against rats, it

should prove of value to make a cordon of tar-protected houses completely surrounding an area containing the infected houses, but separated from them by a zone in which poisoning and trapping only is conducted.

Whilst thus writing with absolute confidence as to the efficiency of this method, it is necessary to state where disappointment has been met in use. Firstly, those employing it must not regard it as a rat killing method and judge it accordingly. Secondly, whilst any tar will serve the purpose to some extent, what is required is a tar which will not consolidate in a few hours on being mixed with sulphuric acid; yet, in the open market, where tar is a waste material after different products have been secured from it, it is not every tar that proves useful. Evidently, what would fulfil requirements best is an acid tar that has not undergone treatment for various products. Dr. H. C. Ross, whom the writer consulted on this point, suggests that "blast furnace tar" is the form that should be sought for. In using this method against rats which burrow in the foundation of houses, it cannot well be traced by what particular hole exit of rats has been attempted; but in use against field rats, where all entrances and exits of burrows have been treated with the mixture, their objection to remaining in the burrow or passing over the tar mixture is exhibited by their rapidly making new exits for escape.

Tar is in use in New South Wales against rabbits. In this case a wisp of straw is tied round the end of a stick; this wisp is then dipped in tar, and over the whole a piece of gunny sacking is tied. The plug thus made is thrust into all entrances of holes that can be found. Here it is anticipated the rabbit will attempt to get out of its burrow by tearing through the gunny sacking, with uncomfortable results when the tar is reached. It is possible this might prove useful against rats.

Plague in Ceylon.

The Reports of the Medical Officer of Health for Colombo (Dr. MARSHALL PHILLIP) for the weekly periods between the 7th July and the 14th September, show that the predominance of the septicaemic over the bubonic type of plague still exists; of all cases reported in which a differential diagnosis had been made, there was a total 44 cases of septicaemic and 42 cases of bubonic plague. Careful enquiry is being made as to the relation of rats to human plague; but the Medical Officer of Health rightly holds that until a full year's experience has been gained and the influence of season upon flea infestation has been ascertained during the ensuing cold weather, it would be premature to arrive at any conclusion.

A point as to which the Tropical Diseases Bureau unfortunately possesses no information is whether the disease has yet extended to the rural areas of Ceylon outside Colombo, and what organisation exists to secure early action in these parts. In the meantime, the facts placed on record by the Medical Officer of Health, Colombo, are of epidemiological interest. Certain of these are quoted verbatim:—

"Fourteen cases were reported as in the previous week. These included two instances of multiple house infection at Forbes Road, where six cases (three in each room) occurred in two rooms within a few yards of each other,

at opposite sides of a narrow alley. Two guinea-pigs were allowed to run loose in each of these rooms, but not a single flea was found upon either of them on the following morning. This differs markedly from the results obtained in similar experiments in India. There was, however, a history of a mummified rat having been found by the occupant upon the roof of one of these houses about 12 days before the occurrence of these cases. . . . One of the cases occurred at 66, St. James' Street, which is a new area of infection as regards human plague, and also, so far as is known, as regards rat plague since this quarter of the town has been trapped since March with negative results. . . One of the cases occurred on Aug. 18 at 115, Wellgate Road, which is a new centre as regards human plague, but not as regards rat plague, which was discovered there so long ago as 4th June. . . Three cases occurred in previously infected localities, while one occurred at Fisher's Hill, Mutwal, a locality where human plague has not hitherto occurred, although plague amongst the rats was detected there as long ago as 23rd March. This is another of many instances where a long interval has intervened between the first appearance of the disease amongst the rat population and the date when the first human being has been attacked. This taken in conjunction with (a) the relatively very light incidence of the disease here compared with in India both amongst rats and human beings; (b) the low flea index; (c) the fact that so far an infected rat flea has not yet been caught; and (d) the negative results of guinea-pig exposures in infected houses, points to the relatively slight degree of infection here and warrants the comforting hope that unless circumstances materially alter, plague will not assume here the devastating character which it has in many parts of India. . . The same measures as hitherto were adopted, the hand Clayton being of a great service. Ten minutes pumping into a hole into which a large rat was seen to run resulted in its death, as proved by breaking up the wall and finding the dead body. . . The method adopted in using the Clayton is to block up all the holes except one in the house, and also in the adjoining house if there is one, and then to pump the fumes into the hole left open. Even so it sometimes happens that the runs extend right through the centre of the wall and open under the tiles. In such cases if a rat is seen attempting to escape up there a man is put on the roof to remove the tiles and block the hole. A considerable number of rats which have thus emerged from undetected holes have been killed by the men who are stationed at various points armed with sticks. As a matter of fact, very few rats which are seen escape."

It is evident that whilst the important position of rats in the epidemiology of plague is fully recognised, the rôle of the infected human being is not being ignored in Ceylon. Apparently, the Indian Plague Investigation Committee have had nothing to say up to date as to the fate of the placenta and discharges in abortions accompanying plague. Information on this point from Ceylon would be of value.

CHOLERA.

The theory of the connection between cholera and the rise and fall of subsoil water held by PETTENKOFER is not likely to be recognised at the present day, unless it can be shown that entrance of the cholera microbe into a water-supply employed for human consumption is thereby brought about. Nevertheless, STAMM's work, an account of which appears in Vol. 3, p. 477, of this *Bulletin*, may ultimately lead to a part justification of that theory. Dr. W. J. Penfold there remarks:—"This work is important in so far as cholera-like vibrios found in water, which do not agglutinate, have been held by various workers to be saprophytic and not genuine cholera vibrios, and if STAMM's work be confirmed the non-agglutinating vibrios ought now to be further investigated, and those that contain the specific agglutininogen may be safely reckoned as specific organisms."

In view of such work, it is possible to revive a theory that was for some time extant, that the vibrio in subsoil water as found in shallow wells is a debilitated true cholera vibrio capable of change of vigour, as a result of the water becoming charged with various salts from the subsoil. It is possible to show that in certain areas in India subject to two monsoons cholera is under favourable conditions in the greater monsoon—a matter readily explainable by the greater facility for the scattering of the comma bacillus by surface washings. In the writer's experience, if cholera be introduced at any other period, it can be readily suppressed. But an epidemic does not get a real hold of an area till about six weeks after the breaking of a monsoon. The subsoil water begins ordinarily about this period of monsoon prevalence to undergo a marked rise. That it is not earlier is on account of the hard and dry condition of the soil at the end of the hot season resisting penetration, so that, notwithstanding the rainfall at the origin of the monsoon, the water level of shallow wells at first continues to fall. In 1894, the writer came to the conclusion that "the period in which marked mortality from cholera occurs is that immediately following the greatest fall of the subsoil water and heralds a commencing rise."

Before accepting such a theory, it is evident much ground would have to be worked over by the bacteriologist and, in adaptation to a particular locality, the possibility of extension of the drainage cone at the season indicated tapping sources of supply of indubitable cholera bacilli would have to be excluded.

Man as a Cholera Carrier.

In view of the increasingly recognised importance of man as a cholera carrier, the work of STAMM mentioned in the preceding note throws light also upon the reference made by Major GREIG (*Indian Journal of Medical Research*, Vol. 1, p. 75) to the fact that "CRENDIROPOULO is disposed to regard the finding of non-agglutinating vibrios in the stools of persons coming from areas where cholera is epidemic as sufficient evidence to place the 'carrier' of such organisms under suspicion. This view, however, requires confirmation."

In former days it was customary to refer to cholera as endemic in the delta of Bengal, and to regard its appearance beyond that limit as of the nature of invasion. But if the "carrier" doctrine, which Major E. GREIG in his investigation as to the presence of cholera bacilli in the bile duct has done much to forward, be combined with STAMM's doctrine, much light would be thrown upon the epidemiology of cholera.

A side light is thrown upon the issues involved in the Report of the Bureau of Health for the Philippine Islands for 1913, by Dr. V. G. HEISER, Director of Public Health, U.S.A. Public Health Service.* In the Philippines, cholera had been absent from 1911 up to August, 1913. The first man attacked was a resident in a hotel at which it was shown that no guest from a foreign country attacked with cholera

*HEISER (Victor G.) [M.D.]: Report of the Bureau of Health for the Philippine Islands for the short fiscal year from July 1, 1913, to December 31, 1913. Govt. of the Philippine Islands Department of the Interior Bureau of Health. 351 pp. 1914. Manila: Bureau of Printing.

had arrived. From the intestinal contents of this fatal case, the true cholera vibrio was isolated. Further, "the first eight cases occurred in widely separated sections of the city and a most careful investigation failed to trace any connection whatsoever between them." Moreover, for two years previous to this outbreak, although examination of the stools of all steerage passengers from foreign countries had been conducted, no case harbouring the cholera vibrio had been detected amongst them. There is in this history, therefore, reason for suspicion that the interval between 1911 and 1913 had been filled by cholera carriers. In this connection, the history of the reported outbreak of cholera amongst the Austro-Hungarian forces in Europe, after a period of apparent quiescence following the Balkan war, may possibly throw light on the subject.

The importance of examining contacts in cholera was much emphasised in the Philippine epidemic by its being found that "of 72 contacts examined, 40 of them were vibrio carriers of some kind and 29 were true cholera carriers." Dr. HEISER in his Report takes occasion to remark that "these results show in a very striking manner the necessity for proper laboratory facilities if a campaign against cholera is to be intelligently directed."

YAWS.

This disease is very prevalent in the Lower Chindwin District of Upper Burma. The following are extracts from a Report by Civil Assistant Surgeon MAUNG SHWE GÊ, L.M.S. (Calcutta), kindly supplied by Lt.-Col. C. E. WILLIAMS, Sanitary Commissioner for Burma. This Assistant Surgeon is a Burman, and was for a prolonged period on special duty in connection with yaws; he therefore was in a good position to trace the etiology of the disease. He states:—

"Contact does not suffice as a means for the infection. People living in intimate relation with the sufferers do not as a rule contract the disease so long as their skin is intact. Out of 83 cases that have been recorded, the seats of primary infection could be traced in 65 to a pre-existing breach of surface. Cases have also occurred where infection took place through abrasions caused by insect-bites, dog-bites, tattooing, burns and vaccination-scarification. A case has also been known where the disease was acquired through sexual intercourse. A suckling child affected with the lesions on the mouth can also transmit to its mother through abrasions on the nipples and *vice versa*. . . .

"The insanitary surroundings, so far as can be judged, have no direct relation in the production of the disease, except that they form the conditions favourable for the attraction of common house-flies and other insects which have been stated to play a very important part as carriers of the infection. In such poor, dirty, ill-ventilated, infected houses, as are frequently met with in this district, and where swarms of flies are generally present, it is easy to understand to what extent infection may spread. Notwithstanding such manifest danger, infection can at all events be prevented under certain reasonable precautions. Instances have been known where in a family, consisting of several members, one or two members have been attacked while the remainder, by observing hygienic conditions, and by isolating themselves in a separate room though living under the same roof, and by using separate drinking vessels, have been able to avoid infection. . . .

"Women suffering from the affection during the whole or part of the time of their pregnancy have been known to give birth to perfectly healthy children with no taint of the disease; and, in the same way, children born of fathers with a history of previous yaws are generally healthy, and are never found in any way more liable to it. Whether born of parents

afflicted with the disease or born of those free from it, they are equally predisposed to the affection. The youngest child recorded by me to have been attacked with the disease is seven months old (i.e., a period which far exceeds the usual incubation period of the acquired disease). . . .

"It has been asserted in certain affected centres that fowls are occasionally seen attacked with a peculiar disease bearing resemblance to human "Toungoo-nah" (yaws), and such fowls are generally regarded as 'infectious.' . . . Experiments performed on healthy fowls by transplanting the human yaws virus on abrasions, have given negative results. . . .

"A Burmese female was inoculated on the 20th September, 1910, with the secretion obtained from a yaw growth of her daughter suffering from the eruptive stage of the disease, on a site previously pricked by a pin until blood exuded. Three days later, the inoculated site was surrounded by a slight inflammatory areola, and a vesicle at the point of inoculation appeared on the sixth day. The skin then resumed its natural condition with no visible scar. On the 24th October, 1910—that is, a month later—there appeared on the inoculated site a fungating ulcer about the size of a very small pea, the margins of which were seen to be inflamed. There was no constitutional disturbances at that time. I left that place on the 25th. . . . On the 19th of December, 1910, the Sub-Assistant Surgeon of the locality reported, 'The ulcer was perfectly healed—no constitutional symptoms whatever.'"

SMALLPOX.

The Relationship of Variola and Vaccinia.

The United States Army Board for the study of Tropical Diseases as they exist in the Philippine Islands, the members of which are Major P. M. ASHBURN, Captain E. B. VEDDER and Lieut. E. R. GENTRY, of the U.S.A. Medical Corps, has issued a Report on "Some Experiments on the Inoculation of Monkeys with Variola Pox" (*Philippine Journal of Science*, Section B. Tropical Medicine, 1913, Vol. 8, No. 1 pp. 17-28, and No. 6, pp. 429-441). As a result of numerous and carefully conducted experiments they furnish the following "Comments" on the results secured by them:—"The case of monkey 5, although of little value standing alone, is certainly susceptible of being cited as an instance of *variola sine exanthemate*, as an instance of separation of the elements of smallpox virus (the pock-producing or 'B' part having acted on the monkey in October; the toxæmia-producing, pyrogenic, or 'A' element in December), and as proof that vaccination protects against the pock-marking element of smallpox rather, or to a greater degree, than against the whole disease. We feel justified in re-stating our hypothesis that smallpox is due to a dual and divisible virus,* one part of which is the cause of vaccinia and the pock stage of smallpox, the other part being necessary for the production of the highly contagious, febrile, general disease with an initial stage and preliminary rashes."

* In a paper read before the Calcutta Medical Society, Prof. W. J. SIMPSON, C.M.G., stated his belief in the dual nature of small-pox virus (*Indian Med. Gaz.*, 1892, pp. 148-157).

Some side light on this subject is afforded by experiments made by the writer (Colonel W. G. KING) in 1891 and in the first quarter of 1892, which are referred to at page 1376 of the *British Medical Journal* of November 7th, 1896, as follows:—

"It is acknowledged, from causes not yet explained, that it is only in a small percentage of cases that inoculation of the calf with smallpox virus is followed by a crop of vesicles. Nevertheless, in certain instances, whilst no local eruption is found, constitutional disturbance occurs, and is exhibited by fever and various skin conditions that I need not here detail. If an animal that has undergone this modified form of variolation be inoculated with animal vaccine, there result vesicles abnormally slow in their progress, but of perfectly typical character. Lymph so gained, when transmitted, is found to be fully regenerated, and is highly active. In these two facts—which I verified repeatedly—lies, I think, the possibility of some explanation of the true nature of vaccine at the hands of the bacteriologist."

Irrespective of the practical utility of the method in securing rejuvenation of animal vaccine, as stated in the above quotation, the American experimenters would seem to concur in the belief there expressed that along the line indicated of a dual character of a virus producing on the one hand variolation without eruption and on the other vesiculation, is the most promising route of investigation for the bacteriologist as to the character of variola and vaccinia.

The obtaining of smallpox virus and calves is frequently not the matter of difficulty in the tropics that is the case in Great Britain; and the writer suggests that in the presence of the numerous scientifically trained workers in India and our Colonies, the endeavour to solve the problem of the relationship of vaccinia and variola, which the Americans have thus ably inaugurated, should be followed by further efforts.

Strains of Vaccine.

In estimating the success rates of vaccine, the character of the vesicles and local and constitutional reaction are points that naturally arrest attention. The fact that a strain of vaccine is still capable of producing vesiculation, however, cannot be regarded as the sole necessary proof of its potency; that much might be accomplished by a decidedly degenerate vaccine. Indeed, certain experiments by the writer have led him to believe that vesicular eruptions other than cowpox can be implanted by inoculation on the calf, and will assume by transfer from calf to calf considerable local similitude to true vaccine but yet be distinguishable. These experiments were conducted so as to exclude contamination with true vaccine.

The power of protection as represented by vigour of stock, or a strain of a stock, can only be answered by lapse of time in the absence of the test of smallpox inoculation. But in dealing with preserved vaccine, it is probable that another factor comes into play. The vitality of a degenerate strain more readily succumbs to vicissitudes of temperature and prolonged storage than one in a state of vigour. It is likely, but still unproved, that coincidentally with this loss of resistance there occurs a degradation of specific power as vaccine in inducing immunity. The question of maintenance of vigour of animal vaccine stock lymph, therefore, is the most important duty with which officers in charge of vaccine institutes are confronted. The Public Health Report for 1913, Zanzibar Protectorate (page 23), thus alludes to the subject:—

"From the subjoined table it will be seen that of the results we know of only three in five were successfully vaccinated, whereas in 1912 the failures only amounted to one in 30. A possible explanation of the large number of failures is that a very high proportion of the people vaccinated nowadays have already been vaccinated once before, but I think besides that the strains of lymph we were using were not as good as in former years."

Duration of Vitality of Preserved Lymph.

*Dr. RINGENBACH reports that on a medical tour between Brazzaville and the coast, owing to the fact that there was no vaccine at Brazzaville, he took with him vaccine in powder supplied by the Belgian doctors at Leopoldville. This had been despatched from Brussels five months before and had been four months in the Colony lying in a drawer in the laboratory. It was mixed with water and glycerin before use. 380 vaccinations were done, with 32 per cent. of successes. He recalls the results obtained by JOYEUX in French Guinea and by SOREL and ARLO on the Ivory Coast with dry vaccine; a sample in the latter case after three weeks in a mailbag on the head of a native gave 70 per cent. of successes.

The following is an extract from the Annual Report, Medical Department, Colony of the Gambia, for 1913 (page 10):—

"Dr. J. A. HARLEY, on tour with His Excellency the Governor and company, vaccinated in all the towns visited, from December, 1912, to May, 1913, when the heat was so great that lymph became inactive. The lanolinized lymph was principally used in the Protectorate, and at Bathurst the glycerinated lymph was used, and the results were favourable."

The results of the two vaccines are not differentiated, but the statement that glycerinated material was used in Bathurst and the lanolinized in the Protectorate by an officer on tour is noteworthy, as an exemplification of selection in view of the respective duration of vitality of the two varieties under tropical conditions. The matter is also attracting attention in the Philippine Islands, where Dr. HEISER, in the Annual Report of the Bureau of Health for 1913 (p. 477), states:—"In this climate the ordinary glycerinized vaccine will not always remain potent for a greater period than one week at ordinary temperature." Consequently experiments are now being conducted in the Islands with dried vaccine.

In a locality where ice can be procured, or the vaccine can be stored at room temperature and utilised within a few days, glycerinized lymph has, the writer believes, a sphere of usefulness; but under circumstances of travel or prolonged transport in the tropics the choice is likely to be limited to either dried or lanolinized vaccine. Good instances of survival of vitality of dried vaccine are given in the preceding paragraphs.

The following extract from a paper, "The Cultivation and Preservation of Animal Vaccine under Tropical Conditions," by the writer, read at the Berlin Congress (1912) of the Royal Institute of Public

* Tournée Médicale effectuée de Brazzaville à Pointe-Noire (Moyen-Congo et Gabon) en Juin et Juillet, 1912.—*Ann. d'Hyg. et de Med. Colon.*, 1914. Apr.-May-June. Vol. 17. No. 2, p. 371.

Health, may afford a useful estimate of the relative value under tropical conditions of lanolinized vaccine :—

" Its duration of vitality must necessarily vary with the degree of care with which it has been prepared, both in regard to the lanoline meeting requirements of purity* and the bacterial cleanliness of manufacture. Thus, in the Madras Presidency, the scab of the vesicle is entirely rejected. Assuming, however, that only specimens so prepared can bear excessive exposure during transit, the following examples of duration of activity in the tropics may be of interest :—

" Surgeon-Major PEACOCKE, when Deputy Sanitary Commissioner for Bombay, reported (1891) that with lanoline vaccine sent by me from Bangalore he had established lymph in certain places in Scinde where the temperature in the shade was from 116° to 119° F. Col. HENDLEY, C.I.E. (then Civil Surgeon at Peshawar), in experimenting on the samples forwarded from Madras of from 17 to 97 days old, obtained a total average vaccination success in 158 cases of 95.5 per cent. and an insertion success of 83.05 per cent. ; at 97 days old, the preparation gave but one failure in 16 cases performed. Col. THOMSON, C.I.E., when a member of the Leprosy Commission, received at Madras on December 13, 1890, an ordinary part of that day's issue. During December, 1890, and January, 1891, the paste travelled with him through Madras, Burma and Bengal ; in February and March it remained in Bengal and the N.W. Provinces. At the end of March it was sent to Simla. It was tested by him with success at various times upon children and calves, and with the last remaining portion, on June 11th, 1891, a calf was successfully inoculated.

" On the 24th July, 1891, I ceased making lanoline-vaccine for the Government of Madras in Bangalore. There was an interval from that time to February 3, 1892, when its preparation was resumed under Dr. PALPU (lately Deputy Sanitary Commissioner) on behalf of the Mysore Government. The stock with which these operations were started was from a specimen of lanoline-vaccine made on the 19th July, 1891, which had been retained in my possession in the interval at room temperature in Madras and in Burma. Encouraged by the success of my retained specimen of the 19th July, 1891, I sent Dr. PALPU a specimen made on the 22nd July, 1891. It was reported by him successful on the 22nd May, 1892. As an instance of a long road journey I may state that under Col. ROBERTS, I.M.S., lanoline vaccine sent from Bangalore enabled him in the early days of occupation by the British to secure a vaccine at Gilgit, after repeated importations of glycerinized specimens had failed. In Kabul the same difficulty had been experienced. Miss (Dr.) HAMILTON, for some time physician to the Ameer of Afghanistan, reported that she established a supply of vaccine for that territory by lanoline-vaccine imported from Bangalore. It was nearly a month (October) on the journey, and was not used till about a fortnight after its arrival. In reply to my queries recently, she reported that the first calf inoculated 'was the picture of what a vaccinated calf's abdomen should be.' A photograph taken by her of subsequent 'removes' shows that the vaccine had fully retained its vigour under her care. VOIGT has stated in the *Archiv. für Schiffs- und Tropen Hygiene* of December, 1911, that the advantage of lanoline over glycerine rests with its better resistance to sun heat. He quotes Dr. ZIEMANN as writing from Dualla that he had carried with him lanolinized vaccine through the whole country from Dualla to Garua, a two months' journey, where, after being stored an additional 36 days, he got 70 per cent. case success.

" In 1908, Major PATTON, I.M.S., placed lanoline-vaccine in a Hearson's incubator, so as to retain it at a temperature of 76° F. for 81 days. At the end of that time it gave 100 per cent. case success and 50 per cent. insertion success. In a Note in his Report ending 31st March, 1908-'09, Major GIBSON, the Director of the King Institute, Madras, states :—' It is important to remark that glycerinized lymph is much more sensitive to high temperature than is lanolinized lymph.' Major HUTCHINSON,

* It must be anhydrous, neutral, and free of glycerine, fats and chlorine.

who has done much to improve vaccination in the Bombay Presidency, and is himself an advocate for glycerine, states that 'lanoline is undoubtedly better than glycerine as a preservative,' but values the former on account of its reputed bactericidal power."

Protection of Vaccine from Heat during Transit.

Dr. RODENWALDT, * writing from Togoland, describes a method of preserving vaccine lymph in the tropics which has rendered him good service, the idea being originally suggested to him by the perusal of an article written by a French colonial medical practitioner (reference not given).

The arrangement is as follows. A piece of growing banana stem is taken, about sixteen inches in length and having an external diameter at its thinner end of about six inches. By means of a suitable knife the inner leaf-stalks are scooped out so as to leave a tube, with a cavity measuring about two inches across, and having walls about two inches thick. It is the property of growing banana stem that it maintains its internal temperature at a constant figure of 23-25° C., whatever the external temperature may be, owing to vital processes, so that if the cavity of such a piece of hollowed-out stem is filled with tubes containing lymph, the vaccine will retain its activity for a full month, provided that the piece of stem remains living for that length of time. The ends of the tube should be plugged with two thick pieces of stem cut to shape. Such a receptacle filled with tubes containing lymph can be safely sent by native messengers on foot for a journey of three or four days duration, without the lymph losing its activity from the heat of the sun.

As a further improvement on this arrangement, the author recommends that, when the medical man himself goes on a vaccinating expedition, he should once a day spray the interior of the receptacle with its contained tubes with ethyl chloride, so as to reduce the temperature of the interior of the cavity to 6° C., the result being to keep the average temperature of the cavity well below the limit of 25°. By taking this precaution the author was once able to maintain a supply of vaccine lymph in full activity for a period of eleven days when on a vaccinating tour. The piece of banana stem used retained its vitality for the whole of this period. At every halt the temperature of the cavity was taken with a thermometer and was found never to exceed 24°. The spray was then used as described and the tube once more closed †.

In the preceding note ingenious methods of protecting preserved vaccine during transport in the tropics are explained. A mode much used by VOIGT may be added to these, viz., the placing of tubes within the interior of potatoes.

* Ueber ein Behelfsmittel zur Konservierung und Versendung von Pockenlymphe in der Tropen. [A Method for preserving and conveying Vaccine Lymph in the Tropics.] *Arch. f. Schiffs- u. Trop.-Hyg.*, 1914. June. Vol. 18. No. 12. pp. 408-414.

† Summarised by Dr. Nias.

Putting aside the possibility of vaccine dispatched by steamer being stored within range of heat of boilers, the writer has always had more dread of the treatment which vaccine may undergo after delivery to a vaccinator than even during transit, involving the carriage of packages as headloads in tropical heat. Hence, he has always required a separate arrangement for protection during transit, and for storage and transport after delivery. Probably the method for transit to tropical colonies which the Lister Institute has employed from time to time, viz., of using thermo-flasks, is a sound one. But when only crude apparatus is available, a small wooden box with a wooden bracket, so as to keep the vaccine in the centre, and surrounding it with a loose packing of cotton wool has proved all that is necessary. Instead of a box, a section of large female bamboo serves the purpose well; and, in late years, an ordinary paper box filled with cotton wool has been freely employed. In the hands of a vaccinator the temptation to be guarded against is the removal of a tube of vaccine from the transit packet, placing it unprotected in the pocket and marching many hours in the sun to the next station on his programme. To meet such requirements the writer devised a box the interior of which was filled with sawdust, so as not to communicate with the external air, and closed in, yet leaving central spaces for receipt of the tubes; a lid was then superimposed. The whole exterior was covered with thick felt. The vaccinator was required to retain the tube of vaccine as soon as received in this box, and to employ it during progress from village to village. The necessity for avoiding exposure of the vaccine to the sun glare whilst in the act of operating was insisted upon. This arrangement was apparently of utility. A later development of these principles in Burma (in consultation with Major O'Gorman LALOR, I.M.S., Deputy Superintendent of Vaccination in that Province) was the use of a tube of asbestos cloth surrounded by cotton silicate—the whole placed within a wooden or bamboo tube.

Infantile Vaccination.

Dr. C. Killick MILLARD, in the *British Medical Journal* of 22nd March 1913 (p. 637) gives the opinion that it is probable that "in spite of increasing neglect of vaccination, smallpox (in this country) will ere long become virtually extinct" and, therefore, argues that "vaccination as a State system, for the compulsory vaccination of infants, is no longer necessary." He believes that, under a sound sanitary system, protection by vaccination is supererogatory. As he particularly specifies that his arguments are applicable solely to Great Britain, it would be beyond our scope to discuss the pros and cons of the question. But in the tropics, where sanitation does not yet work with the precision he concedes is necessary, it is worth while contrasting his findings with results in localities where infantile vaccination is imperfectly conducted at a late period, and those where a better grade is secured by belated but yet earlier vaccination. In areas in India, even where vaccination is compulsory, infants are not vaccinated until they are six months of age, although in the Madras Presidency within Municipalities power is given to vaccinate infants known to be exposed to smallpox infection at any age. It is, however, only in

exceptional rural localities that any compulsory ruling exists. In consequence the protection of infants under one year is poor even in Municipalities, but is better than in rural areas where vaccination is liable to be delayed in a large proportion of cases till the child is over five years of age. Thus in Municipalities of the Madras Presidency in the decade ending 1902, 2·7 per mille of infants under one year of age died of smallpox, but in rural areas the proportion for this age was 8 per mille.

The following facts as to children below ten years of age examined haphazard as found in the streets during inspection of certain towns are significant of the beneficent influence of vaccination, even under the belated conditions stated :—

Children examined without selection in streets.

Towns.	Vaccinated. Per cent.	Not vaccinated. Per cent.	Vaccinated, but marked with smallpox. Per cent.	Not vaccinated, but marked with smallpox. Per cent.	Remarks.
A.	56	44	Nil.	36·4	Compulsion had been but recently introduced in the towns concerned.
B.	33·3	66·7	Nil.	54·5	
C.	44·3	45·7	15·8	93·7	Children are much exposed to infection by attending religious ceremonies in honour of the goddess of smallpox.
D.	73·9	26·1	Nil.	57·1	
E.	42·5	57·5	17·7	74·0	
F.	92·8	7·2	2·6	100	
G.	70	30	2·6	81·6	

Vaccine Success Rate after Smallpox.

The following is an extract from the Annual Medical Report, Nyasaland Protectorate, for 1913 :—

"As stated in the last report, the lanolinized lymph which is supplied by the Lister Institute of Preventive Medicine continues to give every satisfaction. A test inspection of natives, which was made during the year in a large number of districts, with a view to ascertaining what proportion was vaccinated, yielded results which varied from 60 to 90 per cent. in the different districts. In regard to the question as to how long vaccination in the tropics confers immunity against smallpox, it can only be said that the subject is a most difficult one on which to express an opinion. Natives who have recently been vaccinated have sometimes contracted smallpox, and there are instances in which reaction to vaccination has been obtained in natives who have previously suffered from the disease."

The evidence required on the point raised by Dr. HEARSEY, Principal Medical Officer, is to some extent met by the following results of vaccination work by the writer in India and Burma :—

In the Indian Army in 1891, it was not customary to vaccinate native soldiers on enlistment, if they presented well marked signs of previous attacks of smallpox. Of 56 men so marked 75 per cent. responded to vaccination.

Amongst the Vizagapatam hill tribes, Chins, Burmese and Chinese, who had been inoculated with smallpox virus by native methods, it was found that in 1880 the operation had been performed when under fifteen years of age; of these, 5.6 per cent. admitted having been attacked with smallpox during adult life. Of 976 inoculated persons, only 94 had been inoculated when above fifteen years of age; of these, 3.2 per cent. had been attacked during subsequent years with natural smallpox. 313 persons who had been inoculated when below fifteen years of age and were vaccinated in adult life gave a success rate of 80.3 per cent. In the 94 who had been inoculated when above fifteen years of age, the vaccination success rate was 81.8 per cent. Necessarily no statistics of the number of persons who died when attacked synchronously with the inoculated subjects who survived and were examined, could be obtained. However, evidence on this point is available from a Report on an effort to revive inoculation by some inhabitants of a rural area on the frontier of the Madras Presidency in 1906, written by Certificated Sanitary Inspector P. ANNAKUTTI AIYANGAR. According to this account, the mortality amongst those inoculated varied from 20 to 40 per cent. (*Proceedings of the Sanitary Commissioner with the Government of Madras for the first Quarter of 1906*).

PELLAGRA.

Investigations in America.

GOLDBERGER*, the Surgeon in charge of Pellagra Investigation, U.S.A., thus states results of work fulfilled on the subject of pellagra up to September 4th of this year:—"The inference may therefore be safely drawn that pellagra is not an infection, but that it is a disease essentially of dietary origin; that it is caused in some way as for example, by the absence from the diet of essential vitamins; or possibly, as is suggested by MEYER and VOEGTLIN's work by the presence in the vegetable food components of excessive amounts of a poison such as soluble aluminium salts." At the same time, he lays down that this opinion should not be regarded as final "without some practical test or demonstration of the corollary, namely, that no pellagra develops in those who consume a mixed well balanced diet."

As bearing on the grouping of pellagra as a diet deficiency disease, W. F. LORENZ†, Special Expert, U.S.A. Public Health Service, made the experiment of excessive feeding in the case of 27 acute cases of this disease for a period of eight weeks. "Of these 7 died, 3 were unchanged, 13 had improved and 4 were designated as recoveries. In these latter, all visible evidence of pellagra had disappeared, and the mental condition had cleared up entirely." As the experience is limited, he suggests that conclusions are not yet warranted.

* GOLDBERGER (Jas.). The cause and Prevention of Pellagra.—*U.S. Public Health Reps.*, 1914. Sept. 11. Vol. 29. No. 37. pp. 2354-2357.

† LORENZ (W. F.). The Treatment of Pellagra. Clinical Notes on Pellagrins receiving an excessive Diet.—*U.S. Public Health Reps.*, 1914. Sept. 11. Vol. 29. No. 37. pp. 2357-2360.

Nyasaland.

The etiology of this disease as it occurs in the Central Prison, Zomba, Nyasaland, is discussed by Dr. Hugh S. STANNUS, both in relation to diet and the Sambon theory of "protozoal infection of Simuliidae." In regard to the latter theory, he states that the Simuliidae are found in large numbers in Zomba, and that the prisoners are particularly liable to be bitten by them. He leaves this point open, however, by asserting "there is reason to believe that no cases are seen when Simuliidae are not found, though of course cases are not found wherever Simuliidae are present." He shows that maize cannot be inculcated, as it is not used; the grain given to prisoners being rice, grown in the country and delivered with the pericarp, in part, still evident. Before delivery, the rice undergoes prolonged transport in plaited grass bags, and, in 1911 and 1912-13, ran the risk of damage during the rainy season, although apparently in a correct physical condition when judged by the eye. It is stored in galvanised bins, and as these approach depletion, it is found that the rice "contains most of the dust and any fragments and spores of moulds." On this aspect of the subject he concludes:—

"I have dealt with the subject of rice at some length, as there are some significant facts in this connection. It would appear quite possible that the unsupplemented rice diet may be so low in some particular food value as to be the cause of pellagra—as is the polished rice of beriberi. Or, again, the damaged "grain" theory seems to receive possibly some support. Cases of pellagra seen among the general population might be due to want of food of proper nutritional value owing to the famine, or to the eating of damaged food stuffs in the recent times of want."

When, in the light of this declaration, the nature of the ration allowed the prisoners is enquired into, it is found that it consists solely of $1\frac{1}{2}$ lbs. rice per diem, *plus* salt. "They are able in a very small way to supplement this diet by buying green foods with the salt. In normal seasons fish or meat is supplied once a fortnight." Whether or not this diet is responsible for pellagra must be left open to question as Dr. STANNUS desires, but it would seem more wonderful that the prisoners did not present indubitable signs of scurvy and general inanition on such a diet than that they should get pellagra. Obviously, the standardizing of prisoners' diet by the Government of Nyasaland, so as to ensure they possess a due proportion of proteids and anti-scorbutics, is desirable.

Dr. STANNUS places great stress upon a characteristic symptom of the pellagra observed by him, namely, at the angle of the mouth a "a sodden and thickened epithelium with cracks which appear white on the black skin." It affects not only the skin, but is prolonged across the muco-cutaneous junction a little way into the mouth." This symptom is accompanied by a creamy condition of the tongue followed by exfoliation, so as to leave "a bright shiny surface devoid of visible papillae." Whilst not doubting that this condition of the mouth and tongue is characteristic of the pellagra found in Nyasaland, it certainly is not diagnostic; as both this state of tongue and angle of mouth are not infrequently sequels in a native of India partaking of salted fish on the verge of decomposition. It is noteworthy that these prisoners, to supplement their defective diet, were allowed an unstated amount of *fish* or meat once a fortnight!

Zanzibar.

Dr. STANNUS has suggested that pellagra exists in Zanzibar, and supports the opinion by reference to the existence of Simuliidae. The Health Officer, Zanzibar, in calling attention to this opinion asserts that Dr. ADERS, the Government Entomologist, declares that, "so far as his entomological research has gone, none of that family of Diptera have ever been found here. . . . Personally I am not prepared to admit that pellagra exists in Zanzibar or Pemba."

HELMINTHIASIS.

Ankylostomiasis.

Dr. P. C. CONRAN, in the Nyasaland Protectorate Annual Medical Report for 1913, makes the following statement:—"It is of interest to note that LOOSS states that a pure vegetable diet produces a less favourable medium for ankylostomiasis ova than a mixed diet." . . . Now, fish and fowl are more abundant near the lake, where ankylostomiasis is rife, than in the hills, where it is comparatively rare." In the matter of prevention, he urges the importance of night soil conservancy by the use of simple forms of latrines.

W. D. NEISH, Kingston, Jamaica, states* that in his laboratory he has found "that ova and small ankylostomes were destroyed by normal saline solution. This also accounts for the absence of hookworm disease on two estates in Portland, where the labourers live in barracks on the seashore." He, consequently, suggests sprinkling periodically a solution from "rock salt" over portions of ground likely to have been defiled with night soil.

In some localities any form of salt is expensive. Here the writer would suggest the use of the "Lucal Heater," which, worked by petroleum under air pressure, affords a blue flame emitting heat sufficient to melt copper wire rapidly. The burner can be fixed to a long flexible metal tube, and large surfaces of ground can by its means be rapidly exposed to enormous heat.

Bilharziasis.

Dr. CARNEUX states, in the Bacteriological Division of the Zanzibar Report for 1913, that he had the opportunity of keeping faeces derived from a case of rectal bilharziasis, on two occasions, sufficiently long to exhibit liquefaction following commencing decomposition. No water was added in making a microscopic examination, "yet miracidia were found that had hatched out of the ova." He is therefore inclined to support the belief of Professor Looss that "in all probability the mode of entry into the human body is the same as in anchylostomiasis."

* Report of the Advisory Committee for the Tropical Diseases Research Fund, 1913, p. 189.

FIXED DIET.

Fixed diets have the risk of monotony, and the still greater risk, in the case of jails, of their being so calculated in the interests of economy (in respect to subjects from whom hard labour is demanded) that a very slight error in quantity or quality suffices to produce quickly grave alteration in nutrition. Hence, each detail of nutrition and condition of prisoners is an anxious matter to officers in charge. Nevertheless, at times flaws in methods occur which tax not only medical knowledge but the detective abilities of a Sherlock Holmes. Thus, the Rangoon Central Jail (average strength 2,306), according to the Report of Prison Administration in Burma for 1912, by Lt.-Colonel BELL, C.I.E., gave a curious illustration of some temporary defect in diet producing a disease allied clinically to scurvy. This is the description given of it by Captain PRIDHAM, I.M.S., Superintendent of the Jail:—

"The type of the disease was unusual, chiefly differing from the text-book description in the following particulars:—It was almost invariably accompanied by fever (scurvy being apyretic). The brawny swellings were almost entirely confined to the calf and thigh. The coagulability of the blood (tested by the Chemical Examiner, Captain OWENS, who kindly investigated the point) was normal. Issues of fresh vegetables from the jail garden, fresh milk, meat and fish did little to improve matters, while issues of sweet potatoes had an early beneficial influence in most cases."

The Superintendent further states:—"The food has been excellent, in my opinion, both in quality and quantity. The outbreak of scurvy, in the face of a regular supply of good fresh vegetables, is surprising and, at present, unexplained." . . . "It is a fact, however, that issues of sweet potatoes bought in the bazaar were decidedly effective in eradicating the disease."

The normal diet, which long experience of its use in the Burma jails shows is ample, is as follows:—"Rice, 24 oz. (husked and winnowed); dāl or pagees (beans), 4 oz.; vegetables (without stalks or refuse), 10 oz.; oil (vegetable oil), $\frac{1}{2}$ oz.; condiments, $\frac{1}{8}$ oz.; gnapi (fish paste), $\frac{1}{2}$ oz.; salt, $\frac{1}{4}$ oz."

Much less is known about the antiscorbutic power of various vegetables grown in the tropics than is desirable, and it is obvious that there is here scope for original work. It need not, for example, be taken for granted from the above evidence that sweet potatoes are an antiscorbutic of indubitable quality. In jails in India depending upon their own gardens for vegetables, there is often a tendency to trust largely to of the gourd tribe which, although readily giving the desired weight of vegetable matter, have an undesirable percentage of water in their composition. Major E. D. W. GREIG, I.M.S., in his review of the position of the vitamine question in the *Indian Medical Gazette* of April, 1913, mentions two facts that may have a bearing on the case. Quoting COOPER, he shows that beef and rice are inefficient in loss of weight prevention and as anti-neuritics. Although the diet above quoted of the Burma jails shows that no meat is issued, presumably for special reasons, beef was issued during the period of outbreak of the disease in Rangoon and, possibly, replaced the beans upon which reliance is largely placed for the proteids of the fixed diet. Polished rice may be excluded from consideration, as the "husked form" only is used. But in large jails in Burma steam cooking is employed and, although the condition of the average prisoner population of over 16,000 demonstrates clearly this has no

harmful effect on the general health*, it may happen that a special jail garden or other conditions may restrict the variety of vegetables, and the influence of heat might be exhibited on the particular vegetable in frequent use. The steam for cooking is not under pressure—unless slight from the weight of covers of the food boilers; but there is possibly room for deterioration of anti-scorbutic powers, as shown in the following statement by Major GREIG:—"GRYNS has suggested that food stuffs when heated to 120° C. lose their protective power as regard beri-beri. Cabbage heated to 110° C. loses completely its antiscorbutic power, and the juice of the cabbage was inactivated at 60° C. to 70° C., showing, as Axel HOLST points out, that the antiscorbutic capacity is much more "thermo-labile" if the juice is pressed out of the leaves than when it is enclosed in the intact cells." In this connection, it may be recalled that in the American Civil War scurvy was arrested by issue, in barrels, of pickled onions and cabbage, and of slices of raw potatoes preserved in molasses.

In his Report on the Jails of the Central Provinces for 1913, Lt.-Colonel LANE, I.M.S., makes the following remarks on prison scurvy in which the influence of heat is adverted to:—

"In cooking vegetables, it is well known that the salts are boiled out and that pressed vegetables are no use in scurvy. Besides that loss, I am of opinion that the salts in cooking are changed, and lose that active (nascent) property to a large extent, which may be the reason of lime juice being so effective in scurvy, and possibly also eggflip and raw meat juice as pick-me-ups. I have, therefore, ordered that the common country mango chutney, limes, the green seedpods of radishes, cucumbers, tomatoes, small onions, small radishes, according to the season and the opportunities at each jail, are to be given raw to prisoners, preferably at the early morning meal."

This view of the matter seems to the writer to be of an extreme nature and likely to lead to an aggravation of various disease conditions in jails where night-soil is used freely in cultivation, but the result should be interesting sanitarily.

INFLUENCE OF PUBLIC WATER-SUPPLIES IN INDIAN TOWNS.

Major S. A. HARRISS, I.M.S., Sanitary Commissioner for the United Provinces, in a paper read before the Second All-India Sanitary Conference at Madras, showed how very largely the maximum influence of public water supplies which might be expected on cholera prevalence in urban areas has been delayed by such defects as intermittence of supply, and the use of other incompletely protected sources by the inhabitants. Nevertheless, he was able to prove that the number of years in which the cholera death rate rose above 1 per mille was reduced by the filtered water-supply to about half in Dehra Dun, Meerut, Benares, Lucknow and Naini Tal, and in Musoorie, Agra and Cawnpore to *nil*.

The Government of Madras, in their Review of their Sanitary Commissioner's Report for 1913, state:—

"From Statement XIII., appended to the Sanitary Commissioner's Report, it appears that in twelve municipal towns in which a protected water supply has been in existence for more than five years the number of deaths from fever during the last five years was, on an average, 15·5

* FINK (Lawrence G.) (Burma). *Trans. xviith International Congress of Medicine*, London, 1913. Sect. xxi. Trop. Med. & Hyg. Part 2. p. 117.
(c90) c2

per cent. of the total mortality, against 25.0 during the five years previous to the date of the introduction of the water supply, while the number of deaths from cholera was 5.7 per cent. in the later as against 9.8 in the earlier period."

Here, a striking feature in the reduction of mortality from "fevers" is exhibited, notwithstanding in most instances the absence of accompanying drainage. Under similar circumstances, according to a former Sanitary Commissioner of the Punjab, the introduction of water supplies resulted in an aggravation of malaria in that Province. This was probably the case; but, in the instance of Madras towns, a decline of "fevers" after the introduction of water supplies has been amply demonstrated. The important question remains open—what is the nature of this fever which thus declines in the presence of protected water supplies? Granted that a certain amount may be ascribed to typhoid or paratyphoid, their existence amongst the native population would not seem to be of an extent disclosed by these figures. As suggested some years back by the writer, the question is well worthy of special research. Major Fry's "First Report on Malaria in Bengal" shows that typhoid is a serious factor both in urban and rural areas in that Presidency.

ANTI-MOSQUITO MEASURES.

Flight of Mosquitoes.

In deciding the extent of drainage or other anti-mosquito operations in inhabited areas, the most important factor in determining the cost of permanent engineering works is the distance of pools beyond the treated area favourable for mosquito propagation. This being so, it is evident that a much neglected point of research is the distance of flight of the mosquito. Before Ross cleared the air of "miasm" in favour of mosquitoes, the influence of soils afflicted with surplus moisture was fully recognised and distances were fixed which, judged by data now available, did not err on the side of moderation.

In Italy rulings on this point with special reference to irrigation have varied greatly from 1575 up to date; the tendency being to reduction of zones as experience accumulated. Rulings in force subsequent to the incrimination of the mosquito are reproduced elsewhere in this number. CHRISTOPHERS and JAMES suggested half a mile as probably a distance not often exceeded by anopheles; later, at Mian Mir, the former estimated a flight at 1,320 yards. Major GOOD, I.M.S. when in charge of the Ruby Mines area in Burma, gave good reason for thinking that a flight of three quarters of a mile may be indulged in. WATSON showed the influences of various distance from jungle infested with mosquitoes up to 1,000 yards (*vide this Bulletin*, Vol. 4, p. 192). DEMPSTER, of splenic index fame, considered a dry zone of one mile essential for protection against malaria. In the Panama Canal Zone a 400 yard protected area embracing 200 yards subsoil drained, *plus* an area cleared of jungle with oil treated pools within a further 200 yards, was typical of measures employed. But, according to the Lithmian Canal Report for January 1913, the *Anopheles tarsimaculata* and *albimanus* not only can travel a mile but can do so "apparently at right angles to the prevailing wind."

To be able to identify a mosquito found in a dwelling as one bred in a pool at a known distance, would go towards settling financial qualms as to anti-malarial works. On the Panama Canal this has been aided by dyeing mosquitoes—presumably with a colour not an aniline product. The facts are thus brought to notice:—

“It would appear, then, that the *Anopheles albimanus* and *tarsimaculata* in the area mentioned ovideposit in water that is decidedly brackish, so that adults fly eastward for long distances between 6 and 8 o'clock. There is relatively little travel after that hour. Adult anopheles were stained with dye and liberated at the swamp. Subsequently, some of them were collected on the opposite side of the river, at the locks and in houses 4,700 ft. from the liberating station. It should be stated that the *Anopheles* flight was decidedly marked and was easily noted by half-a-dozen witnesses, when their attention had been drawn to it. Even so, not one person in areas strictly infested did note the flight until shown the way to observe it.

It is very interesting to note that there is apparently no large or marked return flight to the swamp from east to west. It may be that such occurs, but that it is of a different nature from the direct flight and not yet understood. The most surprising part of the observations made was that the flight did not extend very far beyond the inhabited area where the employes live. It was expected that with thousands of *Anopheles* adults travelling from the swamp to the settlement each night some would go well beyond the settlement in the apparently direct line of flight. Such extension did not occur.”

In the Report of the Isthmian Canal Commission for February, 1913, the subject was further referred to as follows:—“Several stained *Anopheles* were found near the breeding area more than two weeks after they had been stained at that locality. It is of interest to note that some of the marked specimens were retaken more than 6,000 feet from the point where they were liberated.”

Anopheles Daylight Raid.

J. PRINCE, C.E., Chief Sanitary Inspector, Isthmian Canal in the *Journal of the American Medical Association* of December 20th, 1908, in dealing with mosquito destruction in the tropics stated:—“We have not yet any cases on record showing that *Anopheles* will bite a person exposed to the direct rays of the sun . . . it will bite voluntarily at any hour of the daytime but does so mostly indoors, or out of the direct rays of the sun.” According to the *Report of the Department of the Isthmian Canal Commission* for January, 1913, the *Anopheles* have proved there are exceptions to the rule. It is there stated, “During eight years of sanitary work on the zone only one case was recorded where *Anopheles* have bitten a person standing in the full rays of the sun. That occurred at 8 a.m.” But, in a place described as possessing pools containing from 30 to 75 per cent. of sea water, the larvae were found at unusual density. “The *A. albimanus* and the *A. tarsimaculata* bit quite freely there in the full sunlight at all hours of the day. . . . *Culex* larvae were comparatively scarce.”

Dr. W. D. NEISH, District Medical Officer, Spanish Town, Jamaica, quotes Professor SMITH of New York as holding that the *punctipennis* (the *A. crucians* of Wied.) is a “daylight *Anopheles* and is a great nuisance to travellers on the Mississippi.” NEISH states that “specimens have been found in Jamaica at Montego Bay, Blayre River and Annotto Bay. This mosquito has been proved to carry malaria.” (Appendix VI, Report of the Advisory Committee for the Tropical Diseases Research Fund, 1913).

SANITARY ORGANISATION.

INDIA.

In the Department of Education of the Government of India, there has been issued a very complete and interesting review of the present sanitary circumstances of India (Sanitary, Simla, 23rd May, 1914). After a short historical statement of progress, it is shown that it has been possible to move of late years at a better rate, in consequence of experience gained by the people as to the influence of insanitary factors on the spread and persistence of plague. India no less than England, therefore, will ascribe its sanitary awakening to the scourge of epidemics; for, in the latter country, the science of preventive medicine may be said to date from a severe epidemic of cholera in 1849, which claimed over 35,000 victims.

In respect to organisation, it is shown that Local Governments possess eight whole-time Sanitary Commissioners as their advisers on sanitary matters, aided by 26 Deputy Sanitary Commissioners, of whom one is temporary. The Local Governments have also nine Sanitary Engineers, aided by 16 Deputy Engineers, of whom eight are temporary. The Municipalities will be provided with 42 first-class, and 94 second-class Health Officers. In addition, the City of Delhi and its immediate surroundings have the special care of the Sanitary Commissioner with the Government of India, as well as of three Health Officers, two being temporary—aided by one Sanitary Engineer. When these do not already exist, the Government of India has advised Local Governments to take powers to require Municipalities to appoint Health officers, and to veto the appointment of an unfit person. These bodies have also been recommended to pursue the system already in force in Madras of employing technically trained Sanitary Inspectors in proportion to their populations. Training classes for Sanitary Inspectors are now being held in all the more important provinces. The Calcutta and Bombay Tropical Schools of Medicine will in the near future provide for the training of the superior officers of the Public Health Staffs. It is stated that "the policy of the Government of India is to keep the control of research under itself, but to decentralise other branches of sanitation. . . . In every Province Sanitary Boards have in the past been composed with varying powers, some being merely advisory, others having authority to sanction schemes and allot funds."

India has two Pasteur Institutes—one at Kasauli and the other at Coonoor; the third will shortly be in being at Rangoon; another is suggested for Assam. The Bacteriological Department possesses thirteen laboratory appointments, and has been recently strengthened by fifteen new appointments "for the prosecution of research work and direct investigation in the field." The laboratories available for research are the "Central Research Institute" at Kasauli, the Bombay Bacteriological Laboratory, and the King Institute of Preventive Medicine, Madras. A solid effort towards encouragement of research was made in 1911 by the foundation of the "Indian Research Fund Association." Funds amounting in the aggregate to £100,000 since its inauguration have been placed at its disposal by the Government of India. The present members of the Advisory Body are the Director-General, Indian Medical Service, the Sanitary

Commissioner with the Government of India, the Director of the Central Research Institute at Kasauli, the officer in charge of the Central Malarial Bureau, and the Assistant Director-General, Indian Medical Service (Sanitary); Sir Ronald Ross is an Honorary Consulting Member.

The following statement of policy is not commonly known and will no doubt be welcomed by those interested in tropical research:—“Besides financing the investigations of its own staff, the association gives grants-in-aid to outside research on approved lines.” The results of the excellent research work of officers of the Indian Medical Service under these encouraging conditions will be made better known than formerly by a publication entitled the “Indian Journal of Medical Research,”* edited by the Director-General and the Sanitary Commissioner with the Government of India, in collaboration with numerous well known authorities.

In practical sanitation attention has been bestowed upon urban areas. The Government of India have been able to place large sums at disposal of the municipalities, which are being employed in town planning, improvement of conservancy, water-supply and drainage. Recently, the Government of India have intimated their willingness to permit funds thus given by them for urban sanitation to be in part diverted to rural requirements, provided Local Governments have before them practicable schemes.

Religious Objections to Sanitation.

BENTLEY, in his report on malaria in Bombay City, pointed out that the open wells afforded excellent breeding facilities for the *N. stephensi*†. The Bombay Corporation has accordingly required the inhabitants to close their wells, or to screen them. They are, however, meeting with numerous objections from the inhabitants, which they assert are made on religious grounds by Hindus. Objections of this nature are not likely to be founded on grounds that can be sustained, and but shield the excuse of custom, convenience, and the fear that, as happened a short time back when there was bursting of a main, there would occur shortage of water supply. Putting aside conservative objections to pipe water, which experience shows soon disappear in the presence of completed works, the excuse of the Hindu is that well water should be exposed to the sun if its purity is to be retained; whereas present day doctrine, founded on the experiments of the Massachusetts State Board of Health, is that subsoil water is not thus benefited. Whilst the Hindu may produce modern vernacular books supporting his opinion, it is impossible for him to do so by reference to the standard required by Manu, to which deference must be paid. It will be found that whilst Manu enjoined exposure of surface waters to sun action, no such injunction is given as to subsoil waters. This differentiation is in accord with the best bacteriological and hygienic teaching of the present day. Anyway, such attempts to block sanitary progress should be met by a careful scrutiny of the facts which are brought in support of religious objections.

* Now in its second volume.

† It may be said that about 1900 Major CORNWALL, I.M.S., asserted that *Anopheles* bred in the open wells of the city of Madras.

Very rightly the British Raj stays its hand where these are justly pleaded, but confusion between erroneously founded custom and religion is apt to be taken advantage of to protect vested interests.

CEYLON.

The newly organised Sanitary Department in Ceylon has not been established a moment too early, having regard to the alteration of conditions of passenger traffic which the Indo-Ceylon Railway has brought about. Hitherto, a careful system of passing estate coolies through observation camps in the Madras Presidency* (whence the majority of labourers has been derived) before allowing them to embark for Ceylon, and the supply of information by the Madras Government as to epidemic diseases prevailing in the areas in which recruiting is conducted, have been factors of importance in preventing the spread of cholera and in the (former) immunity from plague. The necessity for increased care as to conservancy and water supply, upon which Sir Allen PERRY insists, must therefore bulk largely in the primary efforts of the new Department.

EGYPT AND THE SUDAN.

Lord KITCHENER'S Report on the general progress of Egypt under his administration, contained in the White Book, Egypt No. 1, 1914, affords details of efforts to found a Public Health Service. Sir David SEMPLE is now Director-General of the Public Health Department, and under him considerable reorganisation has been effected. The Lunacy Section and the Veterinary Section of the Service have been placed under the Minister of Agriculture, "so as to give the Public Health Department a free hand and more time to deal with problems appertaining to the health of the people." The hygienic laboratories have been extended and fully equipped, so as to form up-to-date bacteriological and chemical sections. In the former there are 12 to 14 workers, in the latter 4 to 5. The ophthalmic division has a staff of four inspecting surgeons and 30 hospital surgeons. The central organization is "a Board of Health composed of five members, with the Director-General of the Public Health Department as President." It is to be a consultative and advisory body without executive duties.

In recounting the work undertaken by the Department, special emphasis is placed upon efforts against bilharziasis and ankylostomiasis, and reference is made to the fact that the ova in the case of the former disease have been found in the tissues of the mummies of the 20th dynasty. In expressing hopes that the new organisation will be of benefit to the country in research as to infantile mortality, pellagra, infectious eye diseases, typhus fever and kindred diseases, Lord KITCHENER holds that the time has arrived for practical efforts, because as "we are in possession of definite facts as to how these diseases are contracted, we are better able to apply methods based on knowledge which is the outcome of research. The building and equipping of hospitals is undoubtedly a worthy and, indeed, a necessary

*Maintained at the expense of the Ceylon Government.

object, but it fails to strike at the root of the matter. . . . Prevention is better than cure." The importance of education of the people and the teaching of elementary hygiene in schools are not overlooked, but Lord KITCHENER states, "in the meantime we are justified in taking up immediately active preventive measures to combat the prevalent diseases I have mentioned and steps in this direction have already been taken and will be pushed on with vigour." He then gives the outline of a scheme for sanitary organisation in rural areas as follows :—

"The organisation of a system of village sanitary inspection, consisting of about one inspector for ten villages, who would report to the Markaz doctor all that happened in regard to health questions and sanitary matters in the villages under his charge. A soldier who had served his time and become a non-commissioned officer in the Egyptian army, with a little training in this kind of work, would probably make a very suitable sanitary inspector. The improvements in the villages themselves would then proceed on lines of proper conservancy (which would do much to prevent ankylostoma and bilharzia infections), the filling up of "birkas," the erection of decent, ventilated houses, and the arrangement of a purer water supply."

A travelling ankylostoma hospital has been organised and is pronounced "a marked success." In this connection it is stated that it is intended to introduce conservancy in the villages, a precaution held to be fully justified by results in a German colony, where the proportion of ankylostoma "carriers" was reduced from 64 to 10 per cent. Lord KITCHENER'S views as to the relative positions of sanitation and education in securing advance are expressed as follows :—

"The spread of education and improvement in sanitary conditions should proceed hand in hand, and in this direction Provincial Councils are doing good work. . . . I am glad to say that while large sums are spent on education the interest of the Councils in works of public utility has in no wise abated. They have devoted much attention to various schemes for the improvement of sanitary conditions in villages and, as I have mentioned elsewhere, the welfare of the infant population has been the object of their special solicitation."

The remaining parts of the Report teem with statements of strenuous efforts towards the economic development of Egypt and the Sudan—prominent amongst which are great irrigation works, which not only bring water to the land, but are supplemented by carefully designed drainage works for economising water and *ridding the soil of surplus moisture*—a type of work which, in the interest of malaria prevention, is undesirably rare in certain countries where "wet crops" are a special agricultural feature.

AMERICA.

The following is the definition given in the U.S.A. Public Health Report No. 3, of January 17th, 1913, of the objects of Federal Public Health administration : "The jurisdiction of the Federal Government in public health matters extends over foreign intercourse, interstate intercourse, Federal Territory, and Federal Administration matters, including protection of Indian tribes." The first legislation—bringing ultimately the present organisation into existence—was enacted in 1796. Impetus was given to development by an extensive epidemic of yellow fever in 1878, and possibility of invasion from Europe by cholera in 1893. Practically, all quarantine measures are conducted

by the Service under rules which are placed automatically in force on occurrence of infectious diseases; so that it is not necessary, as in British practice, to declare quarantine against any particular foreign port. American consuls in foreign ports are required to enforce rulings as to American vessels; and at numerous important foreign ports medical officers of the Federal Public Health Service issue bills of health, and report on sanitary conditions and the existence of infectious diseases. Immigration, which is of course still extensive in the United States, is with the aid of international agreements subject to supervision by the Public Health Service. Diseased and the mentally and physically unfit immigrants are rigidly excluded. Hospitals in connection with quarantine and immigration are controlled by the Public Health Service. The Federal Government has the right to issue laws and enforce action in any State in the event of neglect as to epidemics; but in ordinary conditions requests for aid by the Public Health Service emanate from the States concerned, each being expected to use its own staff fully. Aid thus given "may be advisory in character, or may assume a more active form." The Federal Government places yearly on its Budget a sum for measures in preventing epidemics.

During epidemics the opportunity is taken by the Public Health Service to collect information and to study causation; as it is held that "the successful administration of public health laws depends essentially upon a knowledge of the existence and current prevalence of communicable diseases, the conditions that favour their propagation and spread, and the measures that are required for their control." Results secured are published by the Government in various periodicals. These publications have proved of wide world interest and sanitary utility. Research in sanitary interest is an important function of the Public Health Service, by both laboratory and field investigation. Research was from 1901 to 1912 arranged in connection with the Hygienic Laboratory, Washington, but in the latter year recognition was given to research by an Act of Congress. Powers were afforded to the Public Health Service "to study and investigate the diseases of man and conditions influencing the propagation and spread thereof, including sanitation and sewage and the pollution either directly or indirectly of the navigable streams and lakes of the United States."

The Public Health Service has "approximately a corps of 450 medical officers, 50 pharmacists, and a total personnel of 2,000. The Service is a bureau of the Treasury Department of the Federal Government. This is controlled by a Surgeon-General of the Public Health Service, whose central office has for administration purposes the following divisions:—1. Personnel and Accounts. 2. Foreign and Insular Quarantine and Immigration. 3. Domestic (Interstate) Quarantine and Sanitation. 4. Sanitary Reports and Statistics. 5. Scientific Research. 6. Marine Hospitals and Relief. 7. Miscellaneous.

SANITARY RULINGS.

ZANZIBAR.

The Protectorate of Zanzibar has adopted a Dairies Decree, No. 5 of 1913, which follows closely "the main provisions of the "Pure Milk Bill," which has not yet come into force in Great Britain." This is said to work satisfactorily, except that the power to test cows with tuberculin is somewhat vague. Powers are reserved so that the First Minister can revoke or alter any rule.

Previous to 1913, medical examination of children and schools was carried out; since March of that year, however, this arrangement has been expanded so as to embrace all sanitary details of the children and their environment.

GAMBIA (Bathurst).

Dysentery, tick fever and tuberculosis have been added to the list of notifiable diseases. Power to control excavations and to specify spots where latrine contents may legally be deposited has been acquired.

UGANDA.

Rulings as to sleeping sickness have been revised so as to include "further large tracts of country in the Eastern and Western Provinces under infected areas." In the interest of anti-mosquito measures rules have been made applicable to Entebbe "giving powers to remove all pineapples, bananas and other water-holding plants from residential quarters."

In all townships, the area of buildings is restricted to one half of any town plot.

HONDURAS.

An Ordinance has been passed with the object of preventing dealers from foisting on the public the cheaper brands of skim milk. In Hong Kong this idea has been carried a step further, by requiring "tinned" skim milk to be labelled, "Not fit for feeding infants under 1 year of age." In the Philippine Islands Dr. HEISER, in mentioning the foregoing fact, states that it is proposed to meet requirements by so taxing skimmed milk as to forbid competition with the unskimmed brands.

EGYPT AND THE SUDAN.

It is proposed to arrange that demands for increased expenditure by Departments must be presented for sanction in principle in advance of the Budget, so as to secure "adequate discussions of each proposal separately." This sensible ruling is already in force in India, in respect to Government Departments. A particularly useful modification of the same principle in the Madras Presidency requires a Local Authority, before placing a Budget for sanction by its members at a meeting, to afford the District Medical and Sanitary Officer the opportunity of urging sanitary requirements by advising alteration of figures. After a Local Authority has passed its Budget in the Madras Presidency,

it is subject to review by the Surgeon-General with the Government on medical matters, by the Sanitary Commissioner on all sanitary matters, and by the Sanitary Engineer on charges for maintenance of sanitary works; opinions thus received having been considered, Government passes final orders consistent with self-government principles of Local Authorities.

ITALIAN LAW 460 OF 1901.*

Under the above law malarious zones can be defined. In proclaimed zones, local bodies are required to supply quinine free when prescribed by the recognised local medical officer. All Government contractors are bound to supply quinine and medical attendance to labourers gratuitously. The quinine so supplied must be that sold by the State. Within the malarial zones, all public offices, all railway buildings, all buildings used by Companies and by Government contractors, must be protected from the "penetration of aerial insects" from June to December. Proprietors and manufacturers who similarly protect buildings or temporary sheds will, on the proposal of District Sanitary Boards, receive money rewards not exceeding 1,000 francs from the Malaria Fund; where physically possible, landholders are required to prevent interruptions to the natural flow of water, and the formation of stagnant pools or puddles in slight depressions of soil artificially created.

Road and canal contractors are to avoid leaving side pits, in which when they are abandoned water stagnates, and altering the lie of the soil in such a way as to cause the formation of puddles.

The Law is followed by a code of rules for its practical application. The rules assign to the various administrative and sanitary officers their various duties; give detailed definitions of, e.g. "labourer"; provide for the supply of quinine to labourers moving from a malarious zone to another place in search of labour, and for the opening of quinine depôts by private persons where there is no dispensary within two kilometers; impose penalties on sanitary officers who fail to denounce contractors; explain that protection against "penetration of aerial insects" means wire gauze; declare that Government, local and railway officials who disobey the law will incur the penalty prescribed in article so and so of the sanitary law; lay down that engineers and contractors will only be allowed to open pits for road and canal work after demonstrating the necessity to the Chairman of the Union, and getting a license from him, and on condition of filling the pits up within a time to be fixed. Lastly, special rewards are promised to people who cultivate rice in such a way as not to let the water stagnate and become a breeding place for the anopheles; and to people who supply articles for the protection of the person to their coolies.

* Adapted from "A.G.," in the *Madras Mail*, 1904.

Anti-Malaria Italian Regulation of the 3rd February 1809, showing distances then considered necessary.

Of Rice Lands.

1. In future no one shall be permitted to convert land into rice fields, without the special permission of the prefect of the department in which the land is situated.

3. Permission to establish new rice fields can be granted by the prefects only under the following limitations, viz :—

First.—That the field so established shall be at a distance from the capital of the kingdom, of at least 8,000 metres (4·97, or say 5 English miles).

Second.—That they shall be distant from communes of the first-class and fortified places, at least 5,000 metres (3·10, or in round numbers, 3 English miles).

Third.—That they shall be distant from communes of the second class, at least 2000 metres (1·24, or 1½ English miles).

Fourth.—And finally, that they shall be distant from communes of the third class at least 500 metres (0·31 English miles, or about 530 yards).

4. The distance prescribed in the foregoing article shall be measured in right lines from the exterior walls ; in the case of walled space, and in that of open places, from the last house which forms part of the aggregate habitations of these places.

5. The rice fields now existing within the distance prescribed for the capital shall be adapted for other cultivation, within the space of three years from the publication of the present decree, under the penalty specified in article 2.

Of Marcite and Irrigated Meadows.

8. It is forbidden to establish constantly or periodically irrigated meadows in the interiors of inhabited places.

9. By the close of the present year all such meadows shall be adapted to other kinds of cultivation.

10. It is equally forbidden to establish such meadows in the vicinity of communes of the first class of fortified places, without the permission of the prefect.

11. This permission shall be granted only on the following conditions :—

First.—With respect to the capital, the irrigated lands shall be distant 1,000 metres at least (0·62 English miles, or about 1,000 yards).

Second.—With respect to the communes of the first class and fortified places, the lands shall be distant 500 metres at least (about 530 yards).

The distances shall be measured as for rice lands.

TREATMENT OF WASTE.

DISPOSAL OF SULLAGE.

The following quotation from the Medical and Sanitary Report (1913) of the Uganda Protectorate depicts by no means rare conditions in tropical towns, where sanitation is still "in the making":—"With the growth of towns the need for the establishment of proper drainage systems on a permanent basis becomes more pressing every year. In Kampala, especially, slop water and other filth accumulates in the badly graded earth drains in the streets, constituting a nuisance which the small Municipal staff is unable to deal with." Also it is by no means rare for the sanitarian to find his desire for improvement thwarted by the official regret of "want of funds." But even if radical methods must for financial reasons be put aside, it is at times possible to secure at least some mitigation of conditions, pending better times. To this end a description of certain cheap methods the writer has from 1895 onwards excogitated may be of some utility as "makeshifts." Dr. Vivian POORE made several suggestions of the type required, where the end subserved was securing the nitrifying action of soil and disposal by soakage. For example, his excellent trench for disposal of house refuse-water is referred to and depicted in the East Africa Protectorate Annual Medical Report for 1912. The writer's little arrangements were, however, adaptations of the principles which were worked out by the Massachusetts State Board of Health between 1888 and 1890.

In this research work, essentially in favour of applied hygiene, the Americans preceded other nations. Their definition of conditions necessary for purification of sewage by aerobic filters was at once simple and exact. They showed that the nitrification of sewage in filters depended upon the passing of films of the fluid "over the surface of stones with air in contact," and that a filter so arranged that aeration shall occur at reasonable intervals resulted "in the removal for some months of 97 per cent. of the organic nitrogenous matter as well as 99 per cent. of bacteria." In their Report for 1890, the Board stated that "the mechanical separation of any part of a sewage by straining through sand is but an incident which, under some conditions, favourably modifies the results, but the essential conditions are very slow motion of very thin films of liquid over the surface of the particles that have spaces between them sufficient to allow air to lie in contact with the films of liquid....With these conditions it is essential that certain bacteria be present to aid the process of nitrification."

If the principles thus stated be held in mind, it is an easy matter to make adaptations both for disposal of sewage, and household and trade waste waters, as well as to facilitate night soil conservancy. The adaptations by the writer now described are strictly "makeshifts" and do not pretend to more than a grade of bacterial efficiency, but the chances always are that by assuming so low an effectiveness as treatment of from 90 gals. to 150 gals. per sq. yard per 24 hours, considerable bacterial and chemical efficiency is secured, whilst the physical improvement of sewage is readily demonstrable. The material used in strata as shown in the accompanying diagrams

has been chiefly washed gravel of graded sizes, and sharp clean sand; but it is obvious that when these are not procurable broken stones of various grades, old pottery, over-burnt brick, broken china, coal, furnace slag, coral shells or selected hard cinders, can well replace the gravel, and finely broken stone and selected cinders or laterite pebbles the sand. Aeration of the filter material is sufficiently provided for by the normal intermitting of discharge of domestic and, frequently of trade, waste fluids. In working, replacement of material should be avoided as nothing short of prolonged flooding—without sufficient “breathing” (aeration) time—of a filter would put it out of action. A filter that has been in use for some time is at an advantage, in that it is well “seeded” with nitrifying organisms. The surface sand must be kept clear of bulky deposited matter, and be occasionally gently raked to secure aeration if showing signs of clogging, and only on this condition being irremediable by this means should fresh sand be used.

Diagram A shows a household filter to which the name Vizianagram (that being the first place to adopt it) was given. By getting the householders of a street with imperfect side drains to use this at each house under just such circumstances as depicted at Kampala, all nuisance was got rid of. This, however, presupposes that there is a general removal of sewage soaked earth before the filters are brought into use, otherwise the purified water finds in the soil putrescible matter. The Chairman of the Vizianagram Municipality thus describes physical results:—“The domestic sewage filter made when you were here is working excellently well. I have seen the filter myself, and found the dirtiest sewage that is let into it coming out so pure that the water will be accepted for drinking by any human being who has not previously known that it was filtered sewage.”

A variation of the form is found in Diagram B. This is an adaptation of Lowcock's method of forcible aeration of filtration media. This was used immediately outside a public latrine, so as to receive urine and ablution water; another was employed to receive the domestic sullage and urine and ablution water from a household of eight persons. The filtrates were disposed of by soakage on the surrounding soil in both cases. Both the filters and their surroundings remained odourless. The time consumed for aeration by a common hand bellows must have been under two minutes daily.

But soakage on the soil in the immediate neighbourhood of a house should, of course, be avoided when feasible. A search for a vacant plot of ground should be made, which can be rendered available for vegetable, grass or flower gardening under sewage.* Such a plot may often be utilised by leading sewage to it by a makeshift open drain.

Many cheap methods of securing makeshift drains are available, but perhaps the cheapest is the lining of a side drain with puddled clay, and placing upon this lining common roof pan tiles with their concavity upwards. Preferably, these tiles should be dipped in, or

*From private houses in India, in towns not provided with a water carriage system of night soil disposal, the household waste water would contain the urine, ablution water and washings of latrines in addition to the usual constituents of household sullage; it is therefore a sewage.

painted with, a mixture of boiling tar and pitch. The joints may be made with lime mortar painted with the tar mixture, if cement cannot be afforded. By this means sewage from several houses can be brought to a sewage disposal plot. Here it can be received in a covered sewage well of tar soaked brick, with a backing of puddled clay—or, in the absence of cement, lime concrete. If funds will allow, this should be correctly trapped and ventilated. This sewage collecting well can be emptied best by the wooden lever and bucket arrangement known as the “picottah” or “shadoof.” Excellent results could be thus obtained, especially in growing grass for fodder, by broad irrigation of sewage on small plots within a town,* but both for agricultural and sanitary reasons, a sewage which has undergone nitrification would often be preferred.

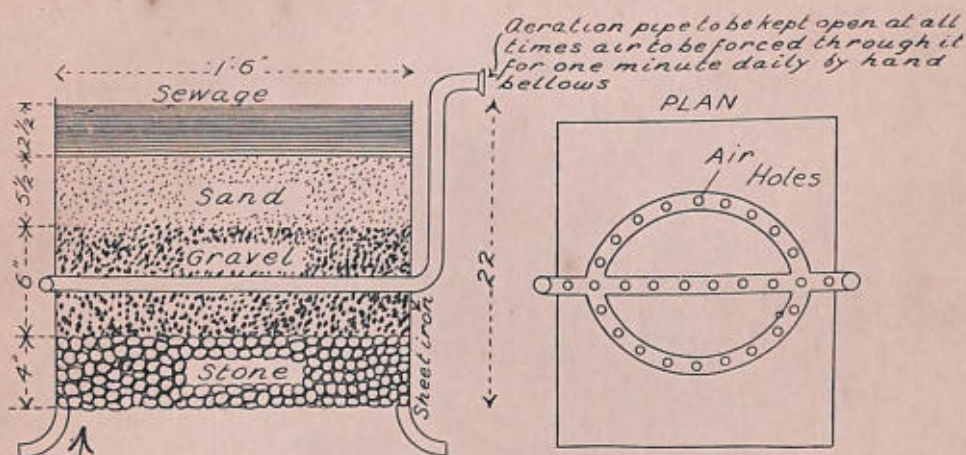
In this case, the use of a simple form of aerobic filter, such as shown in Diagram C, will fulfil requirements. This was first introduced in 1895 by the writer in Vizagapatam and, as a matter of convenience, the filter was named accordingly. The object here was the interception and filtration of a considerable body of sewage from a section of the town which was allowed to flow into a marsh, constituting a nuisance. An energetic District Medical and Sanitary Officer (the late Major VICKERS, I.M.S.) and the Indian Chairman of the Municipality ultimately filled the marsh, and pursued cultivation with the filtrate from a larger filter. The physical character of the filtrate of the original filter was thus described by the Chairman:—“The amount of sewage daily dealt with is about 7,200 gallons (= 750,000 gallons per acre), the filtrate is clear and looks like pure water. At first, a few days after the filter began to work, the filtrate tasted brackish; now it is not so.”

The trench filter shown in Diagram D is the modern substitute of the “soak-pit”; its action was fully studied by the Massachusetts Board of Health. In this not only does purification by aerobic action take place, but by lateral soakage in the soil final disposal occurs. It is an excellent arrangement when dealing with sullage from detached houses, and in camps. Care is required to see that the sullage water is correctly distributed over the surface of the filter. This can be easily effected by placing earthenware half tiles with the concavity upwards but with open joints—after the style of the makeshift drains above described. The writer has secured good results in abolishing mosquito breeding spots by using these, in the absence of a drainage system, to receive the waste from service taps of pipe water systems. If care is taken to make the length of a trench filter coincide with the trend of the surrounding surface, it will act well notwithstanding heavy rain if the soil be fairly permeable.

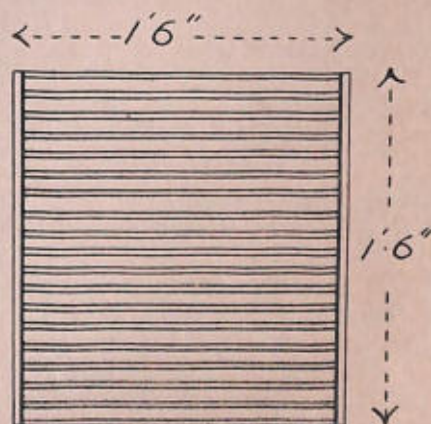
Provided that by allowing intervals of rest aeration is secured, there is no reason why a filter of the pattern of Diagram C should not be constructed below ground, so as to receive sewage direct upon its surface by gravitation from a drain, instead of it being necessary to lift it by mechanical means. In this case, the filtrate could be

*No one would elect to use sewage irrigation within a town if it could be avoided. It must be understood that this “makeshift” method is merely an improvement upon allowing pools of sewage in streets with attendant stench and culices.

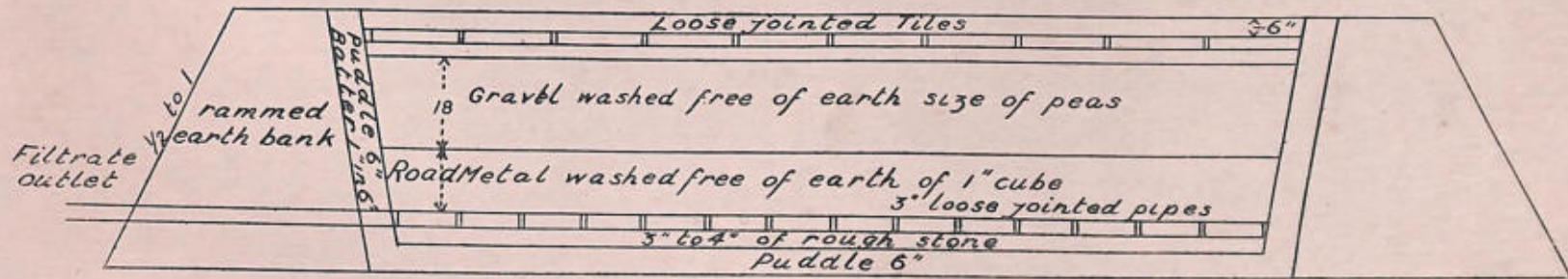
B



close barred
iron wire



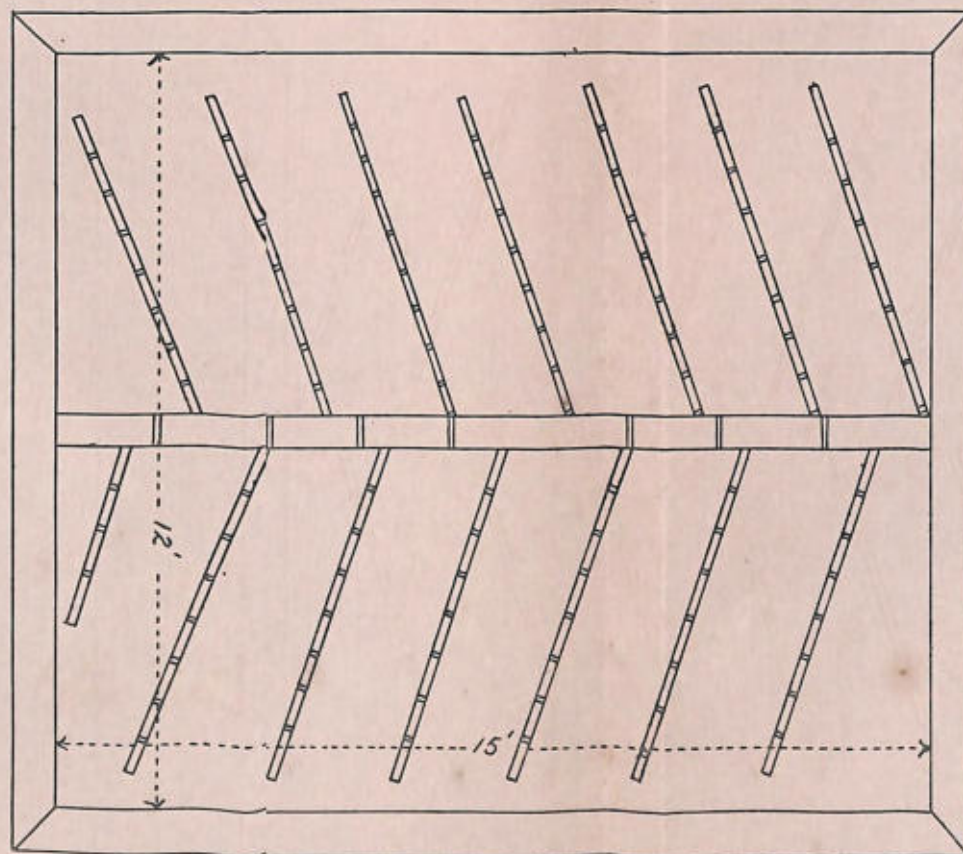
C
(section)



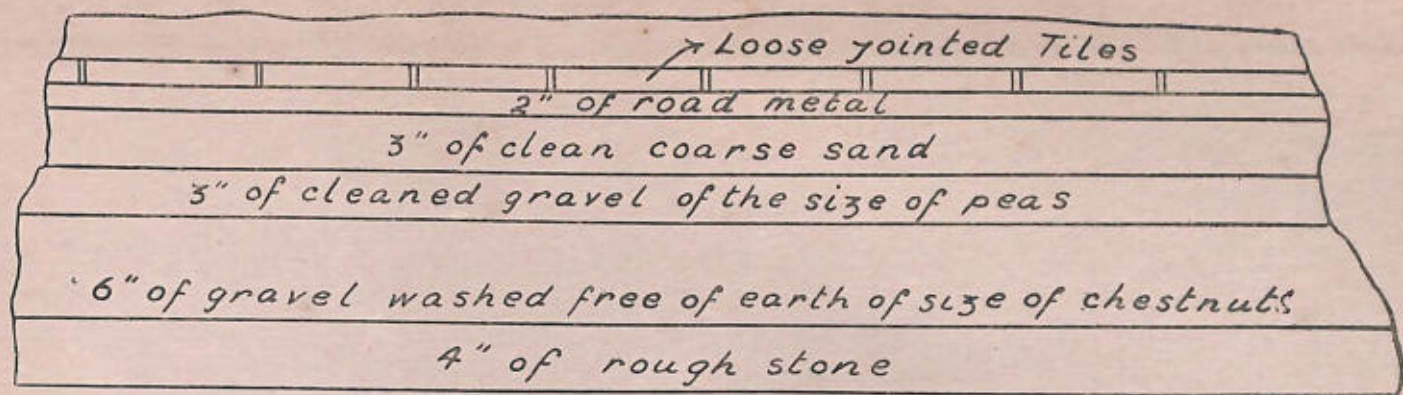
Aerobic filter.

C
(plan)

Aerobic
filter.

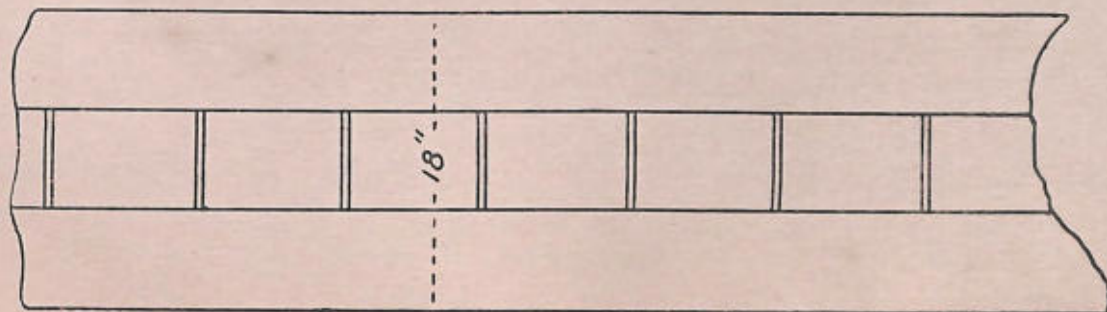


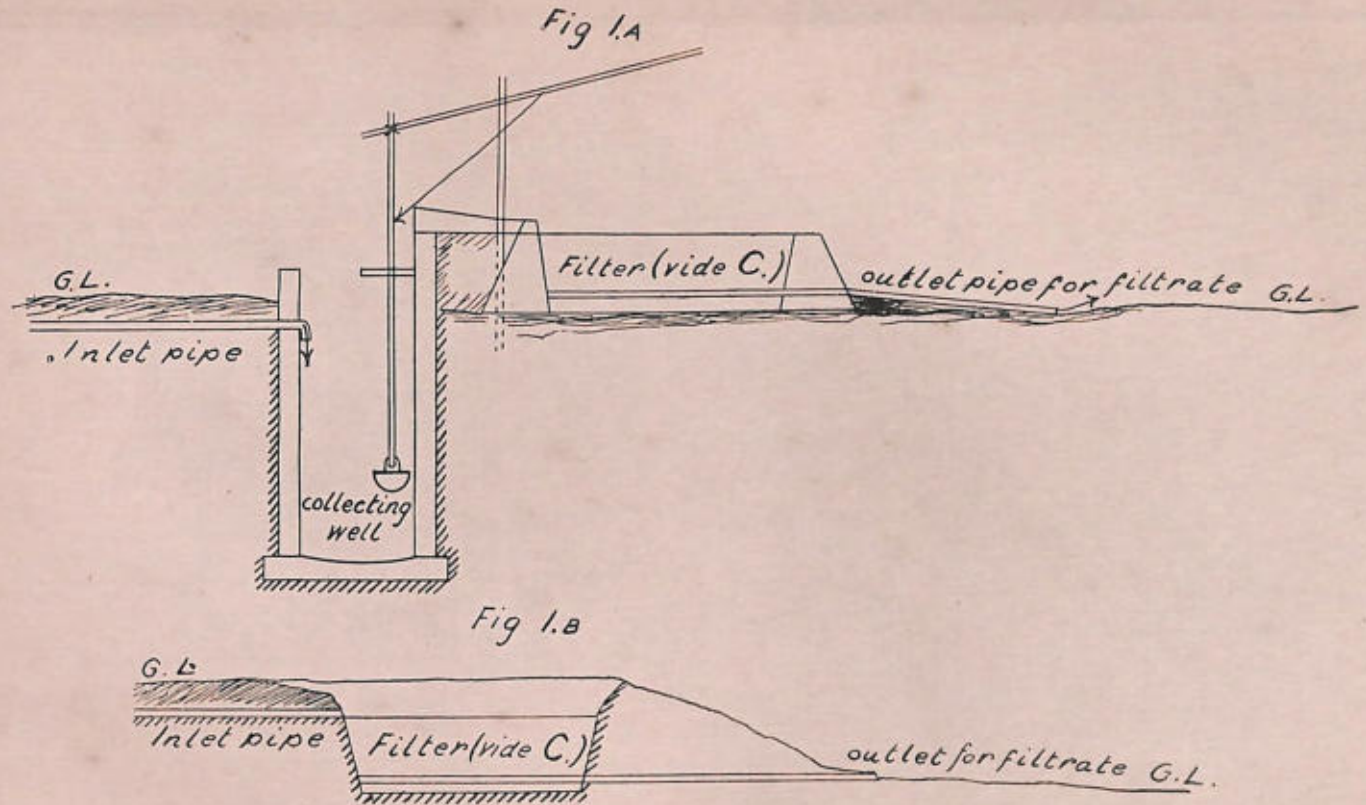
D (section)



Filter trench.

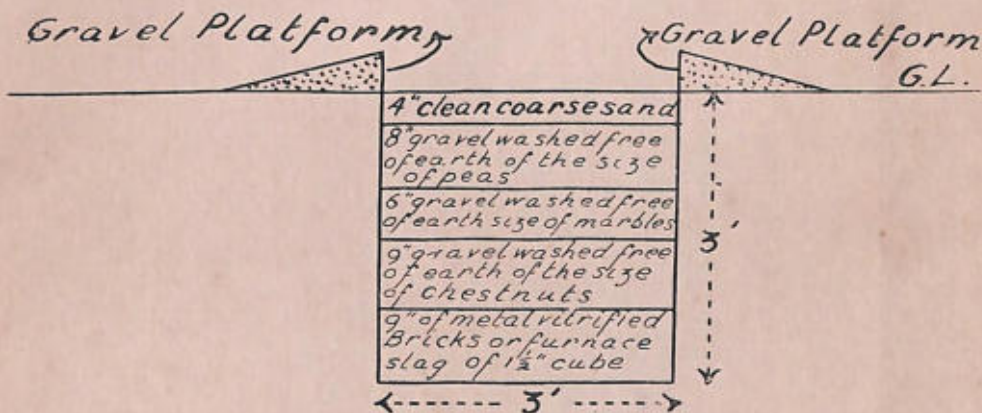
D (plan)



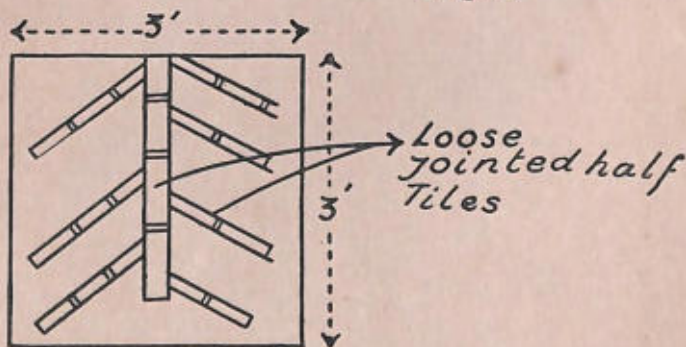


Alternative modes of using Aerobic filter (Diagram C).

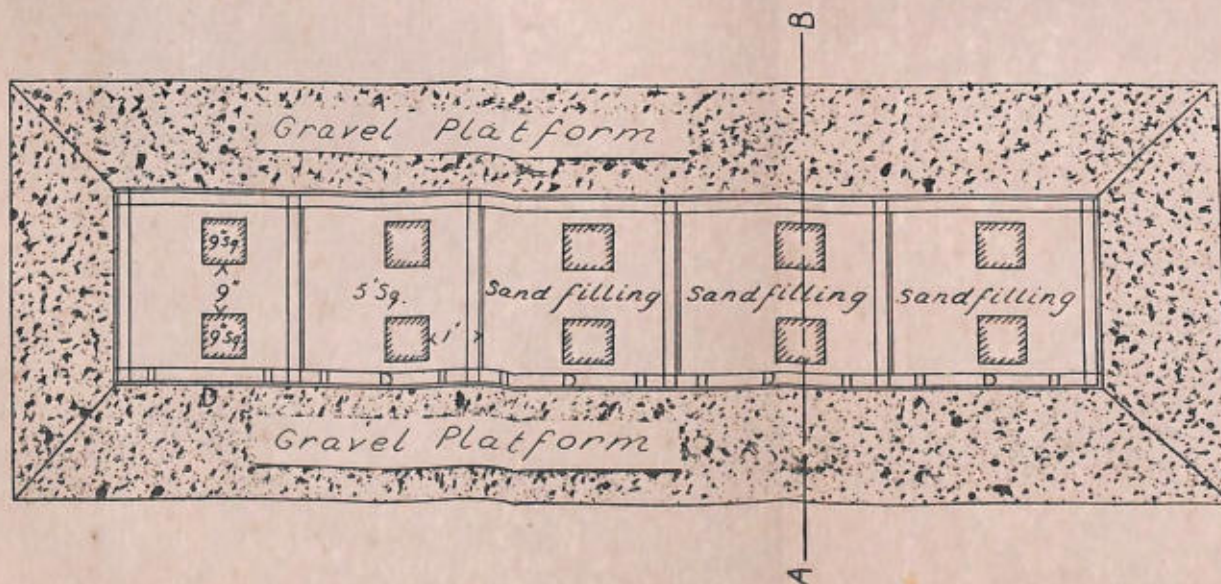
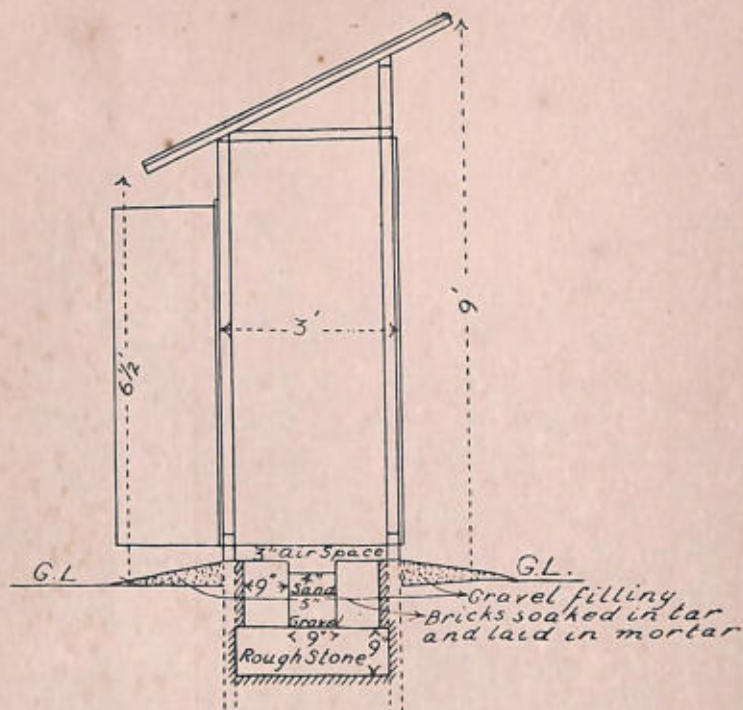
F (section)



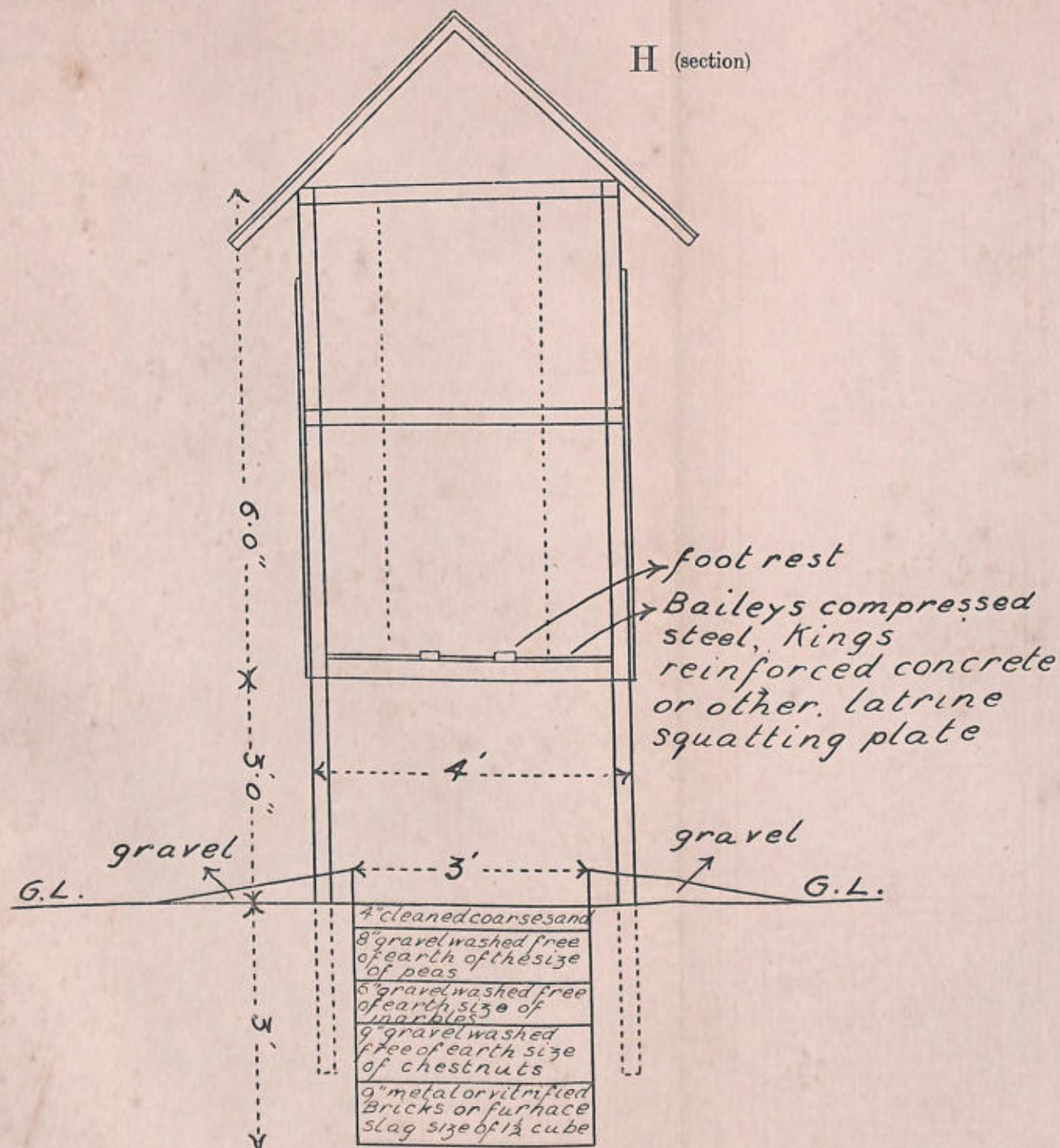
F (plan)



Filter trench latrine.



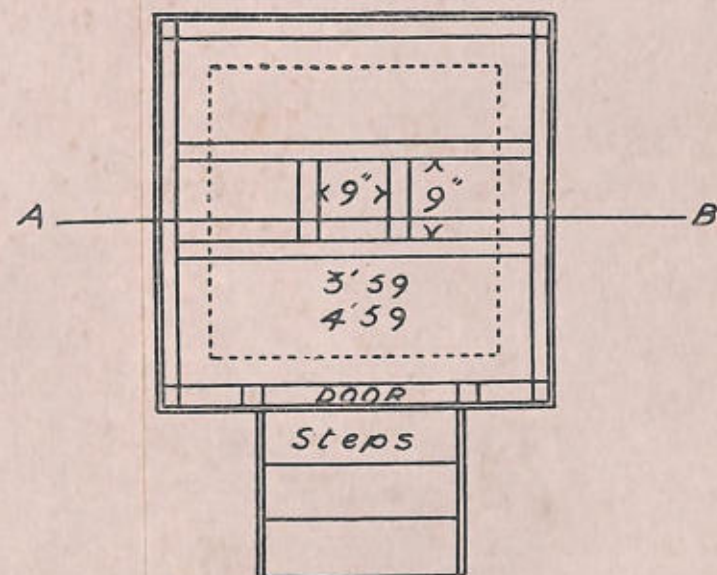
H (section)



Section on AB

Filter pit latrine.

H (plan)



conducted for discharge to a lower level (Diagram E, fig. 1, B). Again, in place of the longitudinal trench and its lateral soakage, excellent results can be obtained with a cubic yard of filter material arranged slightly below ground level and trusting to soakage of the filtrate. In fairly permeable soil, temporary partial water-logging of such a filter does not stay its efficiency. These do excellent service in getting rid of water from bath rooms, kitchens, pantries, etc. (Diagram F).

THE FILTER AND NIGHT SOIL CONSERVANCY.

The desirability of separating the urine from the faeces in direct methods of collection has been long recognised, and is usually supported by the stereotyped statement that the admixture favours decomposition and the emission of objectionable odours. In India, the further objection holds that in the use of buckets for simultaneous receipt of urine and faeces, splashing of the person in the act of defaecation is liable to occur—a disastrous matter in respect to caste. But in the presence of the official “want of funds,” there is a much stronger and little recognised reason why, in systems not depending upon water carriage, separation of faeces and urine should be aimed at, namely, that the cost of transport of faeces is trivial compared to any effort that could honestly remove from a town all urine, irrespective of the fact that the use of ablution water adds largely to the bulk in certain races in the tropics. In systems somewhat more advanced than the “makeshift,” it is possible to attain this by special mechanical arrangements with much greater initial economy than by any of the water-carrying methods; but adaptation of the aerobic filter secures a reasonable compromise between “want of funds” and sanitary essentials, by disposing of all urine and ablution water on the spot and leaving comparatively dry faecal matter alone to be dealt with by transport. This means that conservancy plant may have (in dealing with tropical races subsisting on vegetable diet) five times less capacity than where the transport of both urine and faeces simultaneously is dealt with. In proportion power and cost for traction is reduced.

A glance at diagrams G and H will show that the trench and pit filters readily lend themselves to the separate treatment of faeces and urine. In the trench filter, a cleanly and firm foothold in squatting is obtained by wedging tarred brick masonry or tarred wood upon the gravel foundation.* Care must be taken to see that the footrests for the squatting position occupy exactly the sites shown in the plan, so as to attain proper utilisation of spaces for faecal deposit and the act of urination, respectively.

In the case of the filter pit latrine, the sentry box-shape of the superstructure, as used by Burmans over cesspits, is shown. Any mat and thatch or corrugated iron structure would also suit requirements. It is possible to adapt several forms of impervious platforms to this, but it is desirable that the foot-rests are so sloped from before backwards that all persons squatting shall uniformly be in the position that ensures the urine shall be received on a separate part of the sand surface.

*Glazed stoneware foot-rests would be still better, if funds will run to it.

In cleaning these latrines, the faecal matter is removed with as little adhering sand as possible. As the mass is deprived of much moisture, the collection is rapid and cleanly. It should not be difficult to render these latrines fly-proof. The writer's successor as Sanitary Commissioner in Burma, Lt.-Col. C. E. WILLIAMS, has encouraged the use of these latrines and has reported officially:—"Latrines A and B [Filter trench and pit latrines shown in the accompanying diagrams as G and H.] I have tested the latrine for many months with excellent results. Latrine A is on the same principle. . . . The filter trench is all right so long as at least the upper 12 inches of the soil is not water-logged. I have used it with a layer of paddy husk spread over the sand. The paddy husk is removed with the solid excreta. There is no offensive or urinous smell, as is usually the case in a Horbury latrine." He however considers the height of the platform in the pit filter latrine (intended to give space for removal of faeces and loading of filter) to be in excess of requirements.

In the writer's opinion these cheap makeshift latrines might usefully displace the "salgas" and "choos" largely used by natives in some of our African colonies.

WATER SUPPLY OR DRAINAGE FIRST?

This matter is thus dealt with by the Government of India Resolution, Department of Education—Sanitary—of the 23rd May, 1914:—"In the beginning precedence over drainage was given to piped water supply, but experience has demonstrated the advantage of introducing both concurrently. Without drainage there is no means of carrying off the surplus water, and without piped water supply it is difficult to flush the drains properly." This is a ruling that is obvious. If the money be forthcoming, both should be accomplished at the same time; or, better still would it be if the drainage system were pushed ahead of the water system. Such matters are, however, usually ruled by financial possibilities of communities; and in India, where water-supplies are not financed by companies but by Local Authorities, the pledging of credit for loans of thirty or more years has hitherto forced the question as to order of urgency. The assurance of the Government of India that simultaneous efforts can now be made is a comforting sign of increased prosperity. Having regard to the prevalence of water-borne diseases and parasitic affections, there can be no doubt that in less prosperous days the sanitarian, whilst regretting that funds for both water and drainage systems could not simultaneously be secured, rightly gave precedence to water supply—taking care to guard the evil of surplus water, as far as feasible, by makeshift methods of drainage.

INCINERATION OF NIGHT SOIL.

To incinerate night soil is an ideal long sought after by the sanitarian. Its accomplishment has been recorded from time to time by various methods, but it cannot be said that any mode has yet been suggested that would encourage the hope of universal adoption. To raise the temperature of 1·3 gallons of water from 40° to 212°F.

requires one pound of wood; to evaporate the water from faecal matter, which contains about 75 per cent. of water, is therefore no light task when a large population is dealt with. If the urine accompanies the faecal matter (*plus* ablution water) the task is proportionately increased. Unless, therefore, there is no stint of good fuel used in a reasonably constructed incinerator, the general experience is that the chances of continuous success of an incineration system for night soil are small. The usual difficulty of reaching the ideal is thus stated in the Annual Medical Report of the Uganda Protectorate: "I regret to state that the incinerators at Kampala have latterly not proved as successful as I anticipated; this is partly due to their repeatedly requiring structural repairs, but chiefly due to lack of efficient stoking, as it has been found that the natives object to the work; consequently a large portion of the night soil has had to be buried." The task of the small forms of incinerators devoid of forced draughts must at all times be subject to difficulties, occasioned by variation of labour and grade of wetness of the load, according to season. The writer has found some aid to the securing of draught by fixing over an incinerator chimney an ordinary ventilating cowl, acting by aspiration by facing the wind. He believes also that it should be possible to get excellent results by arranging a detachable Root's blower worked by a small kerosine oil engine, aided by a kerosine spray.

FLY-PROOFING OF LATRINES.

In the *U.S. Public Health Reports* for January 10th, 1913, Dr. C. TERRY gives an excellent illustration of the necessity of fly proofing latrines in Jacksonville. His investigations as to prevalence of typhoid showed that water-supply might safely, and milk supply might reasonably (with the exception of three instances in the case of milk) be excluded. In the city over 8,500 privies existed, of a type and in a position in respect to dwellings highly favourable to transfer of infective material by flies. In 1910, there were 329 cases of typhoid with 62 deaths. By April 1st, 1911 (the beginning of the fly season), 80 to 85 per cent. of all privies were, by a City Ordinance, rendered fly proof. In 1911, there were 158 typhoid cases with 40 deaths, in 1912, there were 87 cases with 16 deaths. In only 38 of these cases was the typhoid of Jacksonville origin. Whilst before the introduction of fly-proofing the portion of the city chiefly infected was that within the area served by privies, subsequent to this there has been no such disproportion. Dr. TERRY concludes:—

"The only change in sanitary condition throughout the city has been the fly-proofing of the privies. Contact has undoubtedly played its part, as it does everywhere, but, in view of the fact that our milk and water supplies could be eliminated, as already stated, I feel that we are justified in attributing the major portion of our cases, prior to the enforcement of the privy law, to the house-fly."

In certain of our African colonies typhoid fever in natives exists, but so far as traced in very small numbers; dysentery is better known, yet, irrespective of the ordinary health requirements of the native population, fly-proofing of latrines has made little progress even within the compounds of Europeans. An ordinary arrangement is

the use of a trench for native servants, which is also used for deposit of faecal matter from the European houses. The deposit of dry earth when carried out on a scrupulously exact system may mitigate possible results from fly-borne matter; but it would seem but reasonable to fly-proof such trenches, including those of the filter variety we have described. The faecal deposit trenches could be cheaply fly-proofed by making a readily moveable structure of angle iron with corrugated iron roof and sides fitted in with wire screens. If the sides were built with a sharp slope, as should be the case (to secure stability and prevent the space at the sides of the trench being used for defecation) the fitting of a self-closing door would be an easy matter.

FLIES AND FOOD CONTAMINATION.

C. Wardell STILES, Professor of Zoology, Hygienic Laboratory, U.S.A. Public Health Service, has endeavoured "to find a method to determine the existence, or probable existence, of faecal contamination of food." He points out that the *Entamoeba coli*, *Lambia duodenalis* and *Trichomonas intestinalis* are residents of the human intestine, and that all three possess "a spore stage that can be recognised by the microscope." Whilst suggesting that it is possible these spores might be carried to food by dried night soil as dust, he considers that this being excluded the finding of these spores on food justifies the conclusion that they have been carried hither by flies (*U.S. Public Health Reports*. 1913. Feb. 14. Vol. 28, No. 7).

FLIES AS "CARRIERS."

The connection between eating of mangoes to excess and the spread of cholera more readily appeals to the lay mind than that the fruit has been contaminated by cholera microbes. The following description of conditions by the Medical Officer of Health, Bathurst (Dr. A. F. KENNEDY), if placed before lay authorities when a locality is threatened with cholera, may hasten their action as to night soil conservancy:—"Several collections of larvae from cesspits were bred out before the rains; all produced the same kind of fly, which was identified as *Muscidea*, *Pycnosoma* [sic]. The chief fruit in season, practically the only one, was the mango, and these flies were frequently found feeding on the discarded mango stones about the streets. Uncovered dustbins and refuse attracted them, and they were generally to be seen in the market, commonly on the meat. Systematic treatment with crude carbolic acid largely diminished their numbers." In this connection an apparently forgotten instance in English practice is worth recalling, as it attracted little attention at the time of occurrence—the typhoid epidemic at Warrington in 1899, when 149 cases occurred. The pail, or rather, tub, system of conservancy was in force—without admixture and entailing exposure of faecal matter. The late Dr. J. Guest GORNALL, who reported the facts of the epidemic, whilst not regarding flies as the sole means of conveyance of the microbe, held that "flies may carry particles of excrement and deposit them on food of any kind. The bacillus will thrive on fruit." He stated:—"It is not difficult, if indeed disagreeable, to imagine during that time that

tubs overflowing with liquid excreta, in course of removal, polluted yards, back passages, streets or even house floors; for, in case 129, you will read that the tub had to be carried through the kitchen."

The following statement by Major PATTON, I.M.S., Assistant Director, King Institute of Preventive Medicine, Madras (Second All India Conference Proceedings), should afford strong ground for improvement of conservancy in rural areas in India:—"The house fly of England did not exist in India. In the north there were two allied species. In Madras, the flies that breed in cow dung never go into the houses. They are an entirely different kind of fly, are blood suckers not biters, and have nothing to do with bazaars and houses. One undetermined species in Madras breeds round slaughter houses on the contents of the carcase of goats. The house fly in Madras breeds entirely in night soil. He had been engaged in this study for about four years.

FLIES AND ANTHRAX.

Experiments as to the possibility of transmission of anthrax by biting flies have been conducted by Mr. Bruin MITZMAIN, Veterinary Entomologist, Government of the Philippines. Infection by contamination of skin abrasions was not attempted; the effort being to secure evidence of transmission by biting flies from animals recently dead of anthrax. Guinea-pigs were also used to receive bites from *Stomoxys calcitrans* and *Tabanus striatus*, which had bitten animals from two and a half hours to ten minutes before death. Anthrax was thus successfully conveyed to guinea-pigs. The *Stomoxys calcitrans* was found to contain anthrax bacilli 14 to 17 days after biting, and the *Tabanus striatus* for 10 days.

SANITARY WORKS.

ARTESIAN AND SUB-ARTESIAN WELLS.

For many years the sole conception of artesian wells furnished in text books was a section of country of a basin shape so arranged that, at a great depth, water was represented confined between two impermeable strata, one end of which was higher than the other. With due regard to the action of a head of water, the upper impermeable layer was shown pierced by a boring, with the result that water was delivered in a splendid fountain at the ground level. No doubt such conditions exist in nature, but they probably are less often met with than those first described by MEDLICOTT in the Memoirs of the Geological Department of the Government of India. He showed that typically favourable conditions for artesian action were obtainable when the configuration approached the condition of a pipe filled with water, having a gradient sufficient to give a good head when the lower end was closed; the result would be that on piercing the upper surface of the pipe at various points, water would rise in proportion to the head. These conditions he held existed in nature where, in the subterranean formation of a plain having a decided slope, water is confined between two impervious layers on its way to its natural outlet. In the upper portion of the tube so formed, in the instance, for example, of the water collecting area being a hill country, as the result of rain action and attrition would be large debris such as boulders, and in the lower or outlet end, the more readily transported finer grade of debris, such as gravels and sands; consequently, friction during water flow is comparatively small at the top of the slope, whilst at the lower end this is so increased owing to smaller voids in the stratum as to approach conditions obtained in the stopping of a pipe. In practice, the gaining of a well that will yield above the surface, and thus fulfil the term artesian, is sufficiently rare to render it unnecessary to speak of wells of this type otherwise than as bored wells.

From perusal of a note by the Sanitary Engineer to the Government of Bombay on "Artesian and sub-artesian supplies of water in Gujarát," read at the "Second All-India Sanitary Conference," the writer suggests that the conditions found in Gujarát are of the character discussed by MEDLICOTT. The required collecting ground exists in the hilly tracts of Mahi Kantra and Panch Mahal, whilst the plains of Gujarát extending thence to the sea contain the impervious layers with boulder of limestone and other rocky debris at the upper portion, and fine gravel and sand towards the sea, the natural outlet of the subterranean water. Necessity of search for subterranean water in Gujarát arose from the fact that the subsoil water is largely brackish and, although rivers flow through the plains, their beds are at a depth from the general ground level which prevents their utilisation.

Mr. BELVADI (the Sanitary Engineer) shows that the first action taken in the Bombay Presidency as to sinking bored wells was by the Agricultural Department of Government. By making boreholes in existing shallow wells furnishing brackish water it has been possible in many

cases, by piercing the impervious layer on which the subsoil water rests, to secure an ample supply of sweet water. Mr. BELVADI explains, however, that the water thus obtained could not be considered free from risk of contamination from surface soakage; because the bed of clay through which the bores are made "does not extend to any great distance laterally." He holds that "the only hope of obtaining a potable supply of water in Gujarát is therefore "to go down considerably deep below ground level, so that water that has no communication with the surface except at the outcrop of the water-bearing strata several miles away from inhabited areas may be made available for use." Hence, the Government of Bombay sanctioned a series of experimental borings. As rocks or boulders were likely to be met with, the type of apparatus selected is capable of boring through rock. The following is Mr. BELVADI's description:—

"We have at present three steam and two hand drills at work. They are all of the Calyx type. One is an A.B.-1 drill, and its capacity is 4,000 feet commencing with a 14 inch bore, and two are F-1 machines capable of boring 800 feet commencing with an 8 inch bore. The hand drills are not capable of boring more than 250 feet starting with 4 inches. The Davis-Calyx drill is a rotary drill working on much the same principle as the Diamond drill; only, instead of a crown of diamonds for grinding away rock "chilled shot" is used. One great advantage of the Calyx machine is that it extracts a complete core of the strata drilled through, and affords more accurate information of the strata. Except when the cutting tools are dropped in the hole through carelessness, the machines give very little trouble and with a little training local mechanics will be able to work them satisfactorily. All plants excepting one were obtained from the Ingersoll-Rand Company through the India Office, London. One Sehrum-Harker and Co's. improved combined percussive and rotary drill for boring holes commencing at 12 inches in diameter with percussion tools, and afterwards continued with the rotary process either with Ardox steel cutters or with chilled shot to a depth of 1,000 feet, finishing with a hole 6 inches in diameter has been indented for this year."

The first boring was made at Sanand. Up to a depth of 38 feet brackish subsoil water was met with resting on clay, below which were found alternate layers of fine sand and clay. Sand and gravel were found at 261 feet and the lining was continued in this layer for another 30 feet. Water rose to within 21 feet of the surface. A twelve hours pumping test gave 752,000 gallons.

But, after undergoing various forms of anxiety as to securing a successful boring, the troubles of a Sanitary Engineer by no means end with the victory of having struck water. The chemical analysis of the water may utterly condemn its use for domestic purposes. Thus, the Chemical Examiner to Government gave the following report on the water—per 100,000 parts, chlorine 70, free ammonia .056, albuminoid ammonia .044, nitrous acid .230. The Sanitary Engineer states:—

"The presence of total solids and chlorine may be accounted for, as tertiary strata are known to contain strings and crystals of rock salt within their layers; but the presence of ammonia showing organic contamination cannot be accounted for, without a detailed examination of the catchment area from which the water is derived. This has not been done, as the bore has been abandoned for the present."

The next boring at Dholka gave the following analysis per 100,000 parts: chlorine 16, free ammonia .002, albuminoid ammonia .002, nitrous acid 0.23. In this case, the Sanitary Engineer makes the following remarks:—

"The Chemical Analyser has reported that the water may be used for domestic purposes in the absence of organic contamination, until other sources of supply containing less solids and less chlorine are available. The catchment area from which the supply is probably derived is free from organic contamination, and the excessive proportion of solids and chlorine are explained by the fact that Dholka was, at no geologically distant date, below the level of the sea. The presence of magnesium sulphate in large quantities goes to confirm this view. In the opinion of local residents the bore water is the best obtainable in the vicinity, and thousands of people have been drinking this water for over a year without any ill effects. The supply may therefore be considered potable."

The writer suggests that in deciding as to the potability of such water nothing but a full consideration of its composition as a chemical mixture fit for drinking, plus a survey of sanitary circumstances on inspection by the local Sanitary Officer or the Sanitary Commissioner with the Local Government, in each particular case, could secure a safe verdict. But similar trouble so surely follows the sinking of borings that it is well for the sanitarian, before giving an opinion, not only to take full account of sanitary and physical conditions within the drainage cone as interpreted by the data furnished by samples of strata passed through, but to remember the caution laid down by Dr. J. C. THRESH as to influence of contact of the iron lining of the bore in decomposing nitrates and thus producing ammonia.* Practical experience also dictates that a specimen of the water for chemical and bacteriological examination must be secured by a trustworthy person. It may well happen that a period may intervene between the striking of water and the determination to secure an analysis, during which responsible engineer officers and workmen may be withdrawn, and many changes may occur owing to evil treatment of the bore lining, the water standing within it and its surroundings by outsiders. Bad joints may lead to almost imperceptible leakage into the bore lining from the subsoil, and leaves and other undesirable additions to the contents may be made. Under such circumstances to take a specimen of water direct from the bore may be most misleading. Hence, it is essential that before a specimen is taken such conditions should be carefully searched for and, in any case, before abandoning a bored well solely on chemical analysis, it should be ascertained by prolonged pumping whether undesirable deposits of salts cannot be washed out of the subterranean soil. At times, the chemical characteristics of the yield of bored wells may be thus vastly improved.

According to a brochure recently published by the Bombay Government ("Some Recent Sanitary Developments in the Bombay Presidency") sinking in great depths of alluvial soil is not without its difficulties; thus it is stated:—

"There are also very considerable technical difficulties in insuring a continuous supply of water in the alluvial soil of Gujarát, because of the necessity of driving casing pipes the entire distance from the surface to the water-bearing stratum, which in some parts is more than 1,000 feet deep. The pressure of the sand and clay increases as each foot is driven.

* "The Examination of Water and Water Supplies": Churchill.

The casing has therefore to be continually reduced in size, and, at last a point is reached where the pipe cannot safely be driven further."

It is nevertheless believed by the Bombay Government that shallow borings carried out with less expensive plants would be effective in providing village water supplies.

BORED WELLS IN BURMA.

In several parts of Lower Burma and at least in one town of Upper Burma (Mandalay) bored wells have been in use for several years. In Lower Burma, as strictly alluvial soil is dealt with, the boring plant employed has been usually of the hydrostatic jet type. Work by this method is ordinarily very rapid; but the writer believes that, for exploratory work in search of subterranean supplies, it is safer to trust to the dry method—as less likely to cause risk of passing through water-bearing strata without their presence being recognised. Rangoon is particularly well provided with bored wells sunk in private or commercial interests. The question was last year considered by Sir ALEXANDER BINNIE, the water-works expert, as to whether these might not prove a desirable addition to the public water supply to meet the demands of its rapidly growing population, and thus save expenditure on enlarged mains or pumping plant in connection with existing gravitation works. He gave it in his opinion that ten million gallons could be obtained from bored well sources daily.

In Rangoon, the artesian conditions follow the type described by MEDLICOTT. The supply stratum having a covering of clay is usually pierced at about 180 feet depth. Sir ALEXANDER BINNIE does not regard the charging of this stratum of water as due to local rainfall, but to a collecting area in the distant Pegu Yoma Hills. In his Report to the Rangoon Municipality on the subject of quality of this water, he points to the fact that the subterranean water is under tidal influence as shown by a rise and fall of 10 to 12 inches, and warns that by excessive pumping the drainage cone might be so extended as to bring about brackishness. He considers that borings in the recognised water-bearing stratum will not be subject to contamination from the subsoil, owing to the continuity of its impervious clay. This conclusion he was doubtless able to arrive at as a result of a study of the numerous existing boring wells—over sixty in number—at his disposal. Thus, carefully considered, a safe opinion can no doubt be given, but in ordinary cases it is well to beware, as Mr. BELVADI (in the preceding Note) suggests, that at times the clay may not "extend to any great distance laterally."

Sir ALEXANDER BINNIE gives very little ground for his belief that the Rangoon subterranean supply is obtained from the permeable area of the Pegu Yoma hill range, although there is no reason why this should not be the case. As Rangoon is situated upon alluvial deposit, there also would seem no reason why the water-bearing stratum may not be an old bed of the Rangoon river. The formed delta shelving to the sea distant many miles would thus supply the high friction exit to the outflow necessary for artesian conditions. At Rangoon, at intervals, are felt "earth tremors" which are not classed with seismic disturbances, but by some are ascribed to the

sudden fall of masses of deposited alluvium to lower levels in the sea. Changes brought about in this or other manner to the exit end, on the analogy of the Medlicott tube theory, are worth holding in mind, when determining whether artesian conditions are probable and, if so, are permanent; for example, if a physical change occurs so as to cause an abrupt cutting of the delta at the sea outlet of the subterranean water, the artesian conditions are rendered much less likely than if there existed a prolonged shelving bank. As a sample in delta formation of the former condition the coast of Madras at Masulapatam and, of the latter, at Cocanada may be mentioned.

SIR ALEXANDER BINNIE'S advice to utilise bored wells to obtain so large a supply of water as ten million gallons daily as an auxiliary to the existing supply must be of great and permanent advantage to Rangoon, as well as awake new interest in the use of bored wells for purposes beyond those of institutions and manufactories, to which their employment has hitherto been largely confined.

A CHEAP SYSTEM OF WELL-BORING.

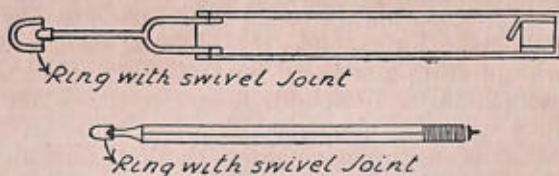
As suggested by the Bombay Government, where village supplies are concerned cheap apparatus is desirable. This opinion is reflected in a pamphlet published by Rao Sahib Pandit Matadin Sukul, M.A., Executive Engineer, Public Works Department, Eastern Bengal and Assam. He confines his suggestion to borings not exceeding 200 feet. Wells have been sunk by him in Sylhet and in Sibsigar, Jalpaiguri and Dinajpur Districts. He states:—

“The cost of borings according to the existing systems, both from the points of view of the cost of tools and their working, being very expensive and almost prohibitive to men of ordinary means, the improved system as described in these notes reduces the cost of both tools and their working to almost an insignificant figure, so that anyone with ordinary means and unskilled labour may be able to undertake trial borings or reclaim existing wells which yield insufficient supply, as has been actually done by the Government and the public in wells at Rampur, Boalia and Natore in the Rajshahi District.”

He maintains that for borings of less than 200 feet, the lining may be very economically arranged for. Thus when the depth is but 15 feet, he considers bamboo pipes would suffice. Beyond this depth, he would use “a steel pipe lap-welded $3\frac{3}{4}$ inches inside diameter, with its sides $\frac{1}{8}$ inch to $\frac{3}{16}$ inch thick.” According to his system of boring—“a chisel or jumper of steel with one end flattened, and the other end turned into a ring for rope attachment is used for cutting a hole in soil, and a tube with a valve opening upwards fixed at one end and a ring for rope attachment at the other end, similar to the jumper, clears the hole of cut earth and running soil and sand and water. This tool is usually called *shell auger*.* Three or four men raise the jumper

* A copy of Mr. Matadin Sukul's diagrams of these tools is attached: excluding the swivel joints, the chisel is stated to be from 3 feet to 5 feet long, and the shell auger 3 feet to 4 feet long.

two or three feet and drop it, cutting earth of any hardness and smashing even stones and boulders. If the hole be dry, a little water is



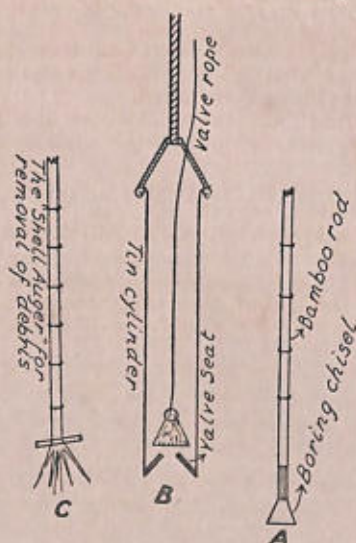
poured into it to convert the cut earth into mud and the shell auger is similarly treated; that is, when pulled and dropped, the auger removes the soil, the mud rushing up raising the valve and closing it at each dropping and raising of the tool."

The Executive Engineer, the writer thinks, is wrong in considering this a new method. The Chinese are credited with boring by the rope and chisel in olden days up to 1,000 feet. The improvement he proffers however, is in the character of the rope he employs, namely "galvanised flexible steel wire rope composed of 6 strands by 24 wires, with hempen core on each strand in a centre of rope, weighing approximately $1\frac{3}{4}$ lbs. per fathom and having a breaking strain of 4 tons." The tools required according to the Executive Engineer for 100 feet, 150 feet, and 200 feet boring would cost Rs.300, Rs.380, and Rs.450, respectively. So that he certainly has met the requirement of cheapness. He considers the daily rate of progress should be from 64 to 12 feet at a cost (coolies wages 5 to 6 annas per hour) from 12 to 6 annas per running foot. Mr. Matadin Sukul's brochure, "Improved System of Boring or Testing for Water for Agricultural and Drinking Purposes," was printed at Shillong, Assam, by the Superintendent, Government Press (price 12 annas), and is well worthy of perusal by sanitarians advising local authorities afflicted with "want of funds."

THE MAKESHIFT BORED WELL.

Whilst Mr. Matadin Sukul's method will, within the depth named by him, serve an important sphere, there remains the possibility of making borings at less depth in alluvial or gravel strata at even cheaper rates. At Yenangoung, Burma, is an important petroleum oil field worked largely on the most advanced American methods. The Burmans in the neighbourhood are therefore acquainted with the principles involved in making a boring. There the writer found a bored well sunk in gravel of over thirty feet in depth, which had been made for the use of his household by an ingenious Burman with the simple implements shown on p. 472. A is a bamboo shod with iron or steel. With a hammering and twirling motion and little exertion the single labourer necessary loosened the gravel. This accomplished, it was removed from the bore by means of a bamboo split at the end and with the parts held apart by inserting another piece of bamboo transversely through the split portion. These split portions retained a certain amount of elasticity, and when thrust over

the gravel debris at the bottom of the bore closed over it—very much as a human hand would do (c). The boring was lined in a square shape at the upper portion by thrusting teak planks into position. For the withdrawal of water, the crude but ingenious bucket B was employed. This was a cylinder made out of an old kerosine tin, open at both ends, but, in the distant end, guarded by a cone of tin with the apex removed. The cylinder was suspended by rope to allow of its being lowered to the bottom of the bore. There was, however, provided a



second rope held loosely in the hand till the bucket reached the bottom of the bore. To this rope was attached a cotton bag containing loosely packed clay. When it was considered the bucket was filled with water the cotton bag was by a motion of the rope allowed to descend over the cone, and made a sufficient though not fully watertight valve enabling the bucket filled with water to be withdrawn.

Boring by this simple method to secure supplies from a lower stratum might often be of the greatest utility in subsoil wells which have become dry. In emergencies, travellers in the tropics might thus provide themselves with water. A section of a female bamboo could very well take the place of the tin of the bucket, whilst the natural arrangement of the joint of the bamboo would replace the cone forming the valve seat.

REINFORCED CONCRETE FOR OPEN DRAINS.

In connection with anti-malaria measures in the Panama Canal area, "many walls of natural streams and ditches have been lined with concrete." In June, 1913, it was reported: "More recently the plan adopted was to make this lining only about an inch thick reinforced at the centre with poultry wire. Such construction has given satisfactory service, and the smaller cross-section reducing the cost per linear foot has enabled more work of this character to be accomplished." The writer believes this cheap and effective form of concrete lining is likely to receive a welcome where the "want of funds" impedes anti-malarial work.

The following Rules concerning concrete lined drains issued by the Isthmian Canal Commission (Circular No. 183-F 3), being the outcome of much special experience, are likely to be of utility to Sanitary Officers:—

“Whenever seepage water outcrops near or at the sides of ditches, sufficient weep holes shall be built into the concrete lining. Such weep holes shall be located in the side walls only. They shall slope downward toward the surface of the ditch floor.

“Key walls shall be used where necessary and when specified on approved plans. A weep hole shall be located in the concrete ditch wall, close to and on the upstream side of each key wall.

“Whenever a pipe line crosses a ditch (and is in the plane of its cross-section, thus acting as an obstruction) the ditch shall be widened at such place before the concrete lining is installed.

“Where possible, branch ditches shall enter the main concrete-lined ditch at an acute angle, and the main ditch shall be made wider at such points.

“On sharply curved sections of ditches, the outer wall shall be raised to prevent the water climbing over it.

“At the junction of a branch and a main ditch, the wall opposite outlet of branch shall be raised.

“It shall be the duty of the Sanitary Inspector to list all necessary repairs to concrete ditches at the end of each rainy season, and have such work accomplished during the dry season, so far as possible.”

VITAL STATISTICS.

THE CENSUS OF INDIA.

In the Report on the Census of India (1911) by Mr. GAIT, C.S.I., the influence of plague mortality in that country is thus stated :—

"It is impossible to make any estimate of the direct and indirect effects of plague on the growth of towns, but it is quite certain that they have been enormous. . . . If it be accepted that the mortality of the decade apart from plague was normal, it follows that but for this disease the population at the Census of 1911 would have been greater than it was by 6·5 million. In other words, the population would have increased 9·3 instead of 7·1 at present."

Putting aside questions of organisations employed to meet plague, which have differed in various parts of the country, as well as the habits of the people and various factors connected with rats and fleas, the extent to which passengers and trade traffic is centripetal or centrifugal—the question of whether populations reside largely in towns or in villages, the degree to which these are scattered and the density of their populations must have affected the facilities for spread of this disease. The Report furnishes the following facts which show how greatly the urban and rural populations vary in different parts of India :—

The total Indian Empire has an area of 1,802,657 square miles, of which 1,093,074 are under British administration. "The area is therefore equal to the whole of Europe without Russia." The population of the whole of India amounts to 315,156,396, of which 244,267,542 are within British Territory. 72 per cent. of the people is engaged in agricultural pursuits. Only 9·5 per cent. lives in urban areas, as compared with 78·1 per cent. in England. Mr. GAIT classes all places having populations exceeding 5,000 as urban (towns) and others as rural villages.

Only 3 per cent. of Assam is urban. The average village contains 233 inhabitants.* In Bengal 6 per cent. of the population is urban, and if Howrah and Calcutta be excluded the percentage does not exceed 4. The average village contains 352 inhabitants. There are 124 towns containing an average of 24,000 inhabitants. In Bombay, 18 per cent. of the population is urban and 82 per cent. live in villages. In Burma, 9·3 per cent. of the population is urban. In Madras 11·7 per cent. is urban; half of the total rural population live in villages of 500 to 2,000 inhabitants. 280 towns afford an average of 17,570 inhabitants. In the Central Provinces, 8 per cent. of the population is urban. Nearly one third of the population live in towns of over 20,000 and one third in towns of 5,000 to 10,000 inhabitants. In the Mahratta Districts, more than half live in villages of 500 to 2,000 inhabitants. In the North West Provinces, 13 per cent. live in towns having an average of 15,000 inhabitants. In the Punjab 10·6 per cent. of the people live in towns and 89·4 in villages. Half the rural population reside in villages of 500 to 2,000 inhabitants, and one-fourth in those of less than 500.

*This is an area where plague has made little progress.

INFANTILE DEATH RATES.

In Trinidad, during 1913, of total births the illegitimate rate was heavy, namely, 68·76 per cent.; in St. Vincent it was 38, in St. Kitts 24·7, in Nevis 25, in Anguilla 26·6, and in Grenada 53·9 per cent. In the Report on the Leeward Islands Colony for 1912, by Dr. W. H. FRETZ, it is stated :—

“ The importance of illegitimacy as a calamity and its effect on infantile mortality is evident. It is beyond doubt that fewer illegitimate children grow up to maturity than children born in wedlock ; it doubles or even trebles the chances of an infant dying before it reaches its first birthday. Illegitimacy is in itself an evil to a man, and one should seek to diminish the number of their births.”

This, of course, is the case, and as the infantile death rate in Nevis is 269 per mille of births, the reason might well be applicable.

In Trinidad, however, Surgeon-General CLARE gives the following explanation of the large amount of illegitimacy ; so that if the Indian population is found largely in the smaller islands, it may well be that not parental neglect but parental ignorance in the midst of insanitary environments is the *fons et origo mali* :—

“ The illegitimacy birth-rate of the total population has advanced slightly from 68·45 to 68·76 per cent. of the total registered births—a high percentage rate prevailing especially amongst the East Indian section ; but the Registrar-General explains this by the fact that many East Indian marriages which are solemnised here according to the religious law and customs of the contracting parties are nevertheless not registerable under the laws of the Colony, and therefore the issue of these marriages are illegitimate.”

It is, of course, possible in the class of Indian immigrants found in the West Indies that irregular matrimonial arrangements occasionally exist ; but it is well to understand that, in the case of the average respectable Hindu, not frivolity but deep religious conviction alone leads to the expense of a second and, at times, more marriages, and that they are contracted only after earnest consideration of the necessity. Parental neglect, the accompaniment of Occidental illegitimacy, is not likely to be an ordinary factor in infantile mortality amongst Indians—on the contrary, beyond ignorance of infant hygiene, much is due to application of crude measures of prophylaxis. In due course, presumably, methods of registration of Indians in the West Indies will be more or less in conformity with those recently adopted in South Africa.

ANGUILLA AS A SANITARIUM.

Statistics issued with the Medical Report for the Leeward Islands Colony for 1913 show that Anguilla has possibilities of being made particularly healthy by modest efforts. In 1911 the death-rate was only 14·8, and in 1912 18 per mille with a birth-rate of 34·8, and an infantile death-rate of 142·8 per mille of births ; against 269 per mille of births, and a total mortality of nearly 31 per mille of St. Kitts. The rainfall in Anguilla in 1912 was 27·46 and in 1911 32·17. The representative temperature of the group of Islands shows that there is no excessive fluctuation, the mean minimum being 76·90° and the mean maximum 82·65°. According to Dr. BURTON “there

are no overcrowded villages and the sanitary conditions in and around the dwellings are on the whole satisfactory. A few cases of imported malaria exist, but other tropical diseases are conspicuous by their absence." Evidently the little island of Anguilla might have a great future before it, if it could further improve its sanitary condition and persuade the profession to use it as a sanitarium.*

*According to the Colonial Office List Anguilla, lying 60 miles to the north-west of St. Kitts, is 16 miles in length, and 3 to $1\frac{1}{2}$ in breadth, containing 35 square miles. It is said to suffer from want of an adequate water supply.—[Ed.]

BOOK REVIEWS.

MUIRHEAD (W. Alex.). **Practical Tropical Sanitation. A Manual for Sanitary Inspectors and others interested in the Prevention of Diseases in Tropical and Sub-Tropical Countries.**—xv + 288 pp. With illustrations. 1914. London: John Murray. [Price 10/6 net].

Staff-Sergeant W. A. Muirhead, R.A.M.C., at present Assistant Instructor at the Army School of Sanitation, Aldershot, is the author of the above book, which is dedicated to Sir Ronald Ross as "the apostle of Tropical Sanitation."

The work is meant specially for the instruction of Sanitary Inspectors in the tropics, but, as suggested by the author's addition of the words "and others," will doubtless fulfil a sphere of utility in the supply of practical information to laymen. Indeed, medical officers of health will find in the several forms employed, and the opinion of the author as to what Sanitary Inspectors can do during hours of duty, first-hand information of value.

The author has managed to compress in less than 300 pages an unusual amount of matter; and whilst this is a great virtue, it is probable that in a second edition some expansion of a few subjects would enhance utility. For example, at page 86, in treating of ankylostomiasis, he omits all mention of the rôle of damp earth in favour of water. "Embryos, forming in four or five days, eventually find water and there live until they reach the next host." In describing public water filters, no mention of methods of regulation of filtration speed is made. The book is rich in neatly designed diagrams and illustrations from photos. To a diagram representing herring-bone drainage of swamps the reviewer would, however, take exception. It is not advisable, as there shown, to make the outlets of lateral drains discharge into the main drains directly opposite each other.

The work is particularly welcome at the present time—as showing the fast growing opinion of the importance of possessing certificated sanitary inspectors specially trained for duty in the tropics, if our Dominions beyond the seas are to be saved from preventable diseases. The Sanitary Inspector is "the man behind the gun," and no accumulation of expert knowledge in the various 'ologies on which hygiene is founded, can be of permanent use to communities until trained executive staffs are at disposal.

W. G. K.

PURVIS (J. E.), [M.D.] & HODGSON (T. R.), [M.A.]. **The Chemical Examination of Water, Sewage, Foods and other Substances.** Cambridge Public Health Series. 228 pp., 1914. Cambridge: At the University Press. [Price 9s. net.]

The authors state that this book, one of the Cambridge Public Health Series, is intended for the use of students who are attending courses of instruction for diplomas and degrees in Public Health and for those who are studying the chemistry of water, sewage, foods, disinfectants, etc. It describes the methods of examination which have been used and tested by the authors, one of whom is a Public Analyst. The subjects treated include water, sewage and sewage effluents (79 pages); milk and its products; butter and other fats; tea and similar beverages; lime juice; poisonous metals in foods; preservatives, etc. The book is handy and well printed and seems to be efficiently indexed. The position of the authors ensures the accuracy of the information.

A. G. B.

ERRATA.

Bulletin, Vol. 4, No. 4, p. 190. Second paragraph, 8th line, for "*in the case of khals of a permanent character*" read "*in the case of bheels of a permanent character.*"

Same Number, p. 236. Second paragraph, 5th line, for "persons about to visit houses locally" read "persons about to rent houses locally."

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES
BULLETIN.

Vol. 4.]

1914.

[No. 9.

PAPPATACI FEVER, DENGUE AND UNCLASSIFIED FEVERS.

LEHMANN. *Phlebotomus* und *Papataci*krankheit. — *Berlin Klin. Wochenschr.* 1914. Feb. 23. Vol. 51. No. 8. p. 378.

The author in a clinical lecture describes the symptoms of this disease as being like those of influenza. It appears only in the summer months and is due to the pappataci flies which abound in Southern Europe, India, and South America, and bite only at night. The incubative period is five days, and the fly appears to be infective eight days after ingestion of blood from a patient suffering from the fever. He states that formalin is the best insecticide. In the discussion SEIFERT drew attention to the fact that the disease had also been observed in Switzerland. The paper contains no new facts.

P. W. Bassett-Smith.

MANSION (J.). *Les Phlébotomes en Corse.*—*Bull. Soc. Path. Exot.* 1913. Nov. Vol. 6. No. 9. pp. 637-641. With 1 text fig.

The existence of sandflies and sandfly fever in Corsica has been reported already (see this *Bulletin*, Vol. 1, p. 238). After six months' fruitless search Mansion captured 56 male and 19 female *Phlebotomi* between September 11 and October 20. The weather had been very hot and dry, and the insects appeared after the first rain. He describes and figures the male appendages of the *Phlebotomus* of Corsica, and claims that it is a new species, naming it *P. legeri*; but neither the description nor the drawing is sufficient to distinguish it from *Phlebotomus major*, vel *perniciosus*. The average length of time which the flies survived in captivity was 45 hours in a dry atmosphere, and 88 when the air was moist. He could not induce the females to suck blood, and he was unsuccessful in finding larvae or hatching ova. Four persons inhabiting a house in which sandflies distended with blood were discovered suffered from symptoms which resembled those of *Phlebotomus* fever.

C. Birt.

MANSION (G.). *Les Phlébotomes européens.*—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 584–590. With 7 text figs.

This is a difficult paper to review as the technical descriptions of the different species cannot be further condensed. There are five species of *Phlebotomus* known in Europe—*P. papatasi*, *P. perniciosus*, *P. minutus*, *P. nigerrimus* and *P. legeri*. Of these the first has the widest range; the last is only known to exist in Corsica and *P. perniciosus* has only been found in Malta and Gozo.

The characters of the armature of the genital organs of the male, the relative length of the segments of the palpi, and the venation of the wings are important differentiating characters and are figured for *papatasi*, *pernicius* and *legeri*. It is a curious fact that the *P. papatasi*, so common in Italy and the Mediterranean basin generally, is unknown in Corsica, and that *P. perniciosus*, frequent in Malta, is not found in Italy; possibly on further examination this restricted distribution will not be found to be correct.

P. W. B.-S.

NEWSTEAD (R.). *Notes on Phlebotomus, with Descriptions of New Species. Part 2.*—*Bull. Entomol. Research.* 1914. Sept. Vol. 5. No. 2. pp. 179–192. With 12 figs.

The author gives a description of four new species of *Phlebotomus*—three from Africa, *P. ingrami*, *P. simillimus*, and *P. bedfordi*, and one from the Malay States, *P. stantoni*. The differential characters of seven other known species are described and figured. It is impossible to do justice to this paper in a short review, as it is very technical. The difficulty of the determination of what are true species is pointed out, the individual variations being so great, and he particularly draws the attention of students to the unreliability of describing a species on one set of characters only; it is a summation of factors that is necessary to establish a species. This is a point which might be usefully remembered in the case of many other small imperfectly known organisms. The importance of making careful drawings is also emphasised.

P. W. B.-S.

D'ORMAY (Lalluyaux). *Epidémie de Dengue en Cochinchine en 1873. Extrait des Rapports de l'Hôpital de Saïgon.*—*Ann. d'Hyg. et Méd. Colon.* 1914. Apr.–May–June. Vol. 17. No. 2. pp. 535–543.

Dengue first appeared in Cochinchina in an epidemic form during 1873, when it was imported from Hong Kong. A description of the epidemic and details of some cases are given, showing the extreme infectiousness of the disease. The "break bone" character of the pains and marked evidence of eruption were noticeable features, the latter being less marked among the Annamites though they suffered severely from the pains, which lasted several weeks and were attended with much debility.

No treatment had any specific effect.

[This is a very full account of an epidemic of true dengue, so well described in MANSON's handbook from his experiences of the same disease at Amoy, and it differs very materially from those epidemics which have been reported lately from Annam and Tonkin.]

P. W. B.-S.

LAVINDER (C. H.) & FRANCIS (E.). **The Etiology of Dengue: an Attempt to produce the Disease in the Rhesus Monkey by the Inoculation of Defibrinated Blood.**—*Jl. of Infectious Diseases*. 1914. Sept. Vol. 15. No. 2. pp. 341-346. With 4 charts.

The authors give a short account of some experimental work carried out by them during 1913 in the United States Marine Hospital, Savannah, Georgia. Recognising that in the study of the etiology of dengue there was a want of animal experimental investigations, they took advantage of the presence of an epidemic of the disease in the city to make inoculations of blood from the patients into Rhesus monkeys. In these experiments the blood was taken from the arm veins of patients in various stages of the disease (2nd to 5th day); it was then defibrinated and injected after a period of from two to six hours, except in one, when the blood was kept for 24 hours in an ice chest. Quantities varying from 3-10 c.c. were injected either intravenously or subcutaneously from eight carefully selected cases into nine perfectly healthy monkeys. The animals were kept under careful observation for fourteen days after inoculation, during which time none of them showed any indication of disease. Attempts to obtain any specific organism from the blood by cultures in glucose broth were negative. As a leukopenia is constantly found in dengue, daily leucocyte counts were made from four monkeys, two injected intravenously from dengue cases, one injected from a case of mumps, and one from an untreated animal as control; the only result of these observations was to show the great irregularity in the number of the white cells present from day to day even in healthy animals, these varying from 12,000 to 24,000 per cmm.

It would appear, therefore, that the Rhesus monkey either cannot contract the disease, or with it shows no signs of illness.

[Further experiments are required to prove this; for instance, the injection of fresh blood without the two to six hours' delay.]

P. W. B.-S.

DEERS (W. E.). **Six Day Fever in Panama.**—*Ann. Trop. Med. & Parasit.* 1914. July 22. Vol. 8. No. 2. pp. 357-365. With 7 charts.

The occurrence of a small number of cases of six-day fever at Panama has been previously described by the author. He now records fifty cases which have been admitted to the Ancon Hospital. Clinically, these agree almost exactly with those commonly found in India and the Far East, called by ROGERS seven-day fever.

There is the typical saddle back temperature curve, the leucopenia, backache, and erythematous rash, but at the Ancon Hospital a palpable spleen was generally present (not noted in Indian cases). The fever appears to be endemic and infective, but in such a way that either many must be naturally immune, or there is an infecting agent that does not convey the disease to all. In the hospital, where no special precautions were taken, the disease did not spread; the infection is therefore probably only present in the pre-febrile stage, or some transmitter is required which was not present in the hospital. The author believes it to be a distinct disease allied to the exanthemata, introduced into the Western hemisphere through the Ancon Post Office, the enlargement of the spleen distinguishing it from dengue.

P. W. B.-S.

LEGER (Marcel). **Maladies Fébriles pouvant prêter à Confusion avec le Paludisme.**—*Le Paludisme en Corse.* pp. 45–63. (Publication de l'Institut Pasteur 1914. Laval: L. Barnéoud & Cie.)

Errors of diagnosis between other fevers and malaria often bring discredit upon anti-malarial measures; for example, the absence of improvement of these fevers when under quinine treatment, as in cases of undulant and typhoid fevers and in tuberculosis. Also the diminution of cases of fever in a district caused by an improved water supply is sometimes pointed out as indicating a decrease of malaria, whereas really the malarial cases remain at the usual level. In Corsica the principal diseases mistaken for malaria are typhoid and paratyphoid infections, undulant and phlebotomus fevers.

Typhoid, paratyphoid and paracolon infections each year cause a considerable number of cases, chiefly from contaminated water and vegetables, particularly at Bastia and the surrounding villages.

The greater part of the paper is devoted to the history, epidemiology, infection of animals, methods of conveyance, symptoms and prophylaxis of undulant fever, and contains nothing new. Attention is again drawn to the rapid spread of the disease over the island from the north, the east coast alone being exempt, and to the frequency with which the disease is contracted through cheese and by direct infection of the hands. For prevention the people require to be instructed in hygiene and the necessity of avoiding infected foods. The disease should be made notifiable, and well-equipped laboratories must be founded for carrying out sero- and lacto-reactions. All infected goats should be destroyed.

Phlebotomus fever is dealt with. This has been recorded by LEGER and SEQUINAUD in Corsica since 1912 and is now very widely distributed, occurring at times in a marked epidemic form during the summer and early autumn months, but it is noted that the variation in the incidence from year to year is very great, depending largely upon climatic conditions. After a careful examination of a large number of the flies, captured at Toga by MANSION, he concludes that the species found there is not *P. papatasi* but a new one, *P. legeri*.

P. W. B.-S.

SMITH (L. F.) & LOUGHNAN (W. F. M.). **Notes on Fevers in Aden.**—*Jl. R. Army Med. Corps* 1914. June. Vol. 22. No. 6. pp. 703–706.

Owing to the experience of the authors of fevers in India, the remarks made by them on the undifferentiated fevers of Aden are of considerable interest. These are divided into three types:—

(1) A continuous fever lasting 14–21 days or longer. This is the most common, is endemic, and occurs throughout the year, attacking both Orientals and Europeans. The onset is gradual; toxic symptoms are fairly marked; headache, backache and tremors, with slight gastro-intestinal symptoms and occasional bilious vomiting with constipation are seen; the later signs are those of secondary anaemia, jaundice and bronchitis. Convalescence is slow. Malarial parasites, spirochaetes, serum reactions for typhoid and for paratyphoid A and B were absent, and examination for undulant fever always gave negative results.

(2) A six to eight day type of fever, like that found in other parts of India, with either a regular fall of temperature or a chart of a saddle-back type. This is most common in Europeans and attacks new-comers. It prevails from May to October when mosquitoes are abundant.

(3) A low continued fever with few symptoms. This runs a long course with dyspeptic symptoms, anaemia, and slight emaciation.

It is noted that the sandfly fever of Aden is less severe than that of the North-West Provinces, and that the common form of fly found is the *P. minutus*, whereas in India the *P. papatasii* is practically the only one of importance. Enteric fever and its allies are infrequent, not being endemic. Malaria is absent, except for imported cases. There are no local anophelines, but *Culex fatigans* and *Stegomyia fasciata* are found all the year round in small numbers.

P. W. B.-S.

DAGORN. Une Fièvre Indéterminée observée à l'Hôpital de Hanoi. [Clinique d'Outre-Mer.]—*Ann. d'Hyg. et Méd. Colon.* 1914. Apr.-May-June. Vol. 17. No. 2. pp. 618-620.

The case referred to was that of a French soldier, aged 26, who was admitted to the hospital at Hanoi in June, 1911, for malarial fever and diarrhoea. The diagnosis of malaria could not be confirmed by blood examinations, neither had quinine any effect upon the temperature, the pyrexia lasting about a month. The serum reaction tests were negative, but ascarides were found to be present in large numbers, and the author considers the case to be one of a continued fever like those described by CROMBIE from India.

[It is not stated what serum tests were carried out; the paratyphoid infections are particularly important to eliminate.]

P. W. B.-S.

CASTELLANI (Aldo). i. Note on Cases of Fever due to *Bacterium columbense* (Cast. 1905).—*Centralbl. f. Bakt.* 1 Abt. Orig. 1914. June 13. Vol. 74. No. 3/4. pp. 197-200.

ii. Note on a Case of Osteoperiostitis developing after a Probable Attack of "Febris Columbensis."—*Jl. Trop. Med. & Hyg.* 1914. June 15. Vol. 17. No. 12. pp. 177-178.

i. In 1905 the author isolated from the stools of a case of fever in Ceylon an organism which he believed then to be specific and called it *Bacterium columbense*; later, from its action on sugars he considered it to be *B. paratyphosus* B. Recently the same organism has been again isolated from two other cases of fever, and he reverts to the original name. It has been obtained from the faeces in all three cases, from the urine in one, and from the blood in one. In each case it gave high agglutination reactions with homologous sera, the patient's serum not reacting with other known specific organisms. The actual classification of the bacterium is difficult owing to its inconstant action with lactose. When freshly isolated it does not ferment lactose, but after several sub-cultures it may give a slight amount of acid and gas. The same irregularity occurs with litmus milk, which is said to become

acid at first and alkaline after [like others of the *Iosarcae* group to which it appears to belong], but bleaching of the medium is of frequent occurrence; occasionally the milk is rendered permanently acid, and after some weeks it may even clot [a series of contradictory reactions difficult to explain in a pure culture]. The cases clinically lasted from three to five weeks, and were like moderately severe typhoids. Constipation was present in two of the cases and diarrhoea in one. Relapses may occur.

[The differentiation of these intestinal organisms by their fermentative reactions alone is generally believed to be unreliable, the serological tests being more satisfactory.]

ii. In this paper the author describes the characteristics and reactions of the bacterium described above. In the case referred to the osteo-periostitis developed as a sequela of a fever which had lasted six weeks. The peculiar microorganism was isolated from the pus, and the blood gave agglutination reactions with the several strains of the *B. columbense* with which it was tested. The author therefore believes that this bacillus was causative of both the fever and the local condition.

P. W. B.-S.

STATHAM (J. C. B.). Report on a Series of 833 Medical Pyrexias occurring in the Sierra Leone Garrison during the Period October 4, 1912, to October 4, 1913, with Remarks on the Bearing of these Diseases on the Health of the Troops.—*Jl. R. Army Med. Corps.* 1914. July. Vol. 23. No. 1. pp. 42-50.

The very high proportion of fevers at Sierra Leone caused by malaria is shown in this paper, for out of 833 cases of pyrexia three-quarters were proved microscopically to be thus infected; of the 623 cases, all but seven were caused by the sub-tertian parasite. The author is inclined to believe that the "race" of sub-tertian parasite as found on the West Coast differs from the ordinary one, as it shows the following peculiarities:—(1) Crescent forms are more rarely found; (2) the great difficulty occasionally met with in finding parasites at all; (3) greater amenability to quinine. West Africans also possess a considerable amount of immunity, tending to make the attacks shorter than in Indians or Europeans.* Seven cases of pyrexia were described as blackwater fever; two of these were due to intense malarial infections and in two the haemoglobinuria was due to drugs (quinine and camphor).

Trypanosomiasis occurred twice in soldiers of the West Indian regiment. No definite cases of leishmaniasis were found either in man or animals. There were 70 cases of undiagnosed fevers, many of which were probably malarial, but the patients were not sufficiently examined. Neither dengue nor pappataci fever appears to have been present in

* The Sierra Leone garrison in 1912 consisted of British (303), African (1,432) and West Indian (520) troops.

an epidemic form, and *Phlebotomus* are not found in the district. Typhoid is very rare, though it probably exists among the natives to a certain extent. *Ankylostomiasis* also in some cases gives rise to pyrexial symptoms; this was noted 21 times. An examination of the West Indian Regiment showed 56 of the men to be affected; thymol treatment is stated not to have been successful. This disease is possibly of next importance to malaria in frequency and seriousness, and the preventive measures which are required to deal with these two infections are discussed fairly fully.

P. W. B.-S.

VERRUGA PERUANA.

RIBEYRO (R. E.), MACKEHENIE (D.) & ARCE (J.). i.—Inoculabilidad de la Verruga Peruana á los Animales. ii.—Primeras Tentativas de Inmunización en la Verruga Peruana. [i.—Inoculability of Verruga Peruana into Animals. ii.—Preliminary Attempts at immunizing against Verruga Peruana.]—Trabajos presentados al V Congreso Médico Latino Americano, VI Pan-Americano, Lima, 9-16 di noviembre de 1913. 16 pp., with 5 plates. Lima: Imprenta y Fábrica de Fotograbados Sanmarti y Ca.

In these two papers, which were read at the 5th Latin-American Medical Congress at Lima in 1913, the authors give an account of their attempts, firstly, to inoculate verruga peruana into the lower animals and, secondly, to produce immunization against the disease. The animals employed were rabbits, guinea-pigs, dogs, asses, goats, sheep and monkeys, while the material used was obtained from hospital patients, being rubbed up with salt solution. Positive results were obtained when injections were made into the testicles of rabbits, and into the foreheads of monkeys, and with scarifications of the bellies or chests of dogs, sheep and goats. The period of incubation ranged from nine to sixteen days. The lesions produced, of which macroscopic photographs only are given, are described as consisting of a new growth, which did not ulcerate, composed of embryonal blood vessels surrounded by leucocytes. In no case did it generalise. Animals which had once been successfully inoculated in this manner did not re-act a second time, showing that some degree of immunization was produced.

To test the question further, a second series of experiments was carried out on rabbits. It was found that the virus was destroyed when rubbed up with salt solution and heated to 56° C. for half an hour, or by simple admixture with glycerin, without heating, for 24 hours. Rabbits were immunized by successive doses of such sterilized material for varying periods, and then tested by inoculation with fresh material from the human subject, in every case with a negative result, showing, as the authors believe, that immunization had been obtained. The experiments on which this conclusion is based being somewhat numerous, reference should be made to the original paper for further details.

J. B. Nias.

HERCELLES (Oswaldo). **Enfermedad de Carrion.** [Carrion's Disease.] —*Cronica Medica, Lima*, 1914. Mar. 15. Vol. 31. No. 605. pp. 67-72.

The author regards STRONG's opinion, expressed at the 5th Latin-American Congress, as to the essential duality of the two stages of Carrion's disease, as ill-founded. He quotes several cases which have come under his own observation in which the stages of eruption and fever have alternated successively in a definite manner in the same individual; and at the post mortem examination of one of these patients, who died in the febrile stage, the characteristic eruptive tumours were found on the liver and spleen, although there were none on the surface of the body.

J. B. N.

ODRIOZOLA (Ernesto). *Unidad de la Enfermedad de Carrion*. [The Unity of Carrion's Disease.]—*Cronica Medica, Lima*. 1914. June 15. Vol. 31. No. 611. pp. 157-162.

A clinical lecture, in which the author supports the views expressed by HERCELLES (see above) as to the identity of Carrion's disease and verruga peruana, as being alternating stages of the same complaint, in opposition to the suggestions of STRONG as to their essential duality. The principal argument adduced by the lecturer in the present case is that he knows personally of cases where the patient has suffered from the febrile stage of Carrion's disease in Peru and has developed the eruptive or "verruca" stage later on in Europe, where there is no possibility of acquiring the disease, so far as is known.

J. B. N.

TOWNSEND (C. H. T.). i.—*Human Case of Verruga directly traceable to Phlebotomus verrucarum* (Dipt.).—*Entomol. News, Philadelphia*. 1914. Jan. Vol. 25. No. 1. p. 40.

ii.—*Sequelae of Human Verruga Case Traceable to Phlebotomus verrucarum* (Dipt.).—*Ibid.* Mar. 14. pp. 131-132.

The author, accompanied by two assistants, visited in September, 1913, the Verrugas Canyon to investigate the cause of verruga and to obtain material for inoculation experiments. While there they used an ointment recommended by Prof. NEWSTEAD to protect them from the bites of the flies; nevertheless, one (N.) on the night of September 17th was bitten by the phlebotomus fifty-five times on the hands and wrists. The marks were recognised as being similar to those produced by this fly on the author on a previous visit. Culicidae were said to be absent at the time. Examination of N.'s blood on October 1st showed the verruga X-bodies, but there were no clinical symptoms. On October 25th there was a rise of temperature and the X-bodies were more abundant. The patient entered hospital, under the care of Dr. BARTON, and on November 10th neosalvarsan (30 cc.) was given intravenously. A mild fever lasted for three weeks, terminating on November 15th. On December 24th the first sign of the verruga eruption was noticed and nodules continued to appear up to the date of writing (25th January). The patient had not been in the verruga zone at night since November 6th. The author considers that both the fever and the verruga eruption were due to the phlebotomus bites of September 17th.

[Of this there is no conclusive proof, for others known to have been bitten by these flies have not contracted the disease, and the statement that neosalvarsan is a specific against the disease is premature. A complete history of the case, to be published by Dr. BARTON, will probably contain more definite details.]

P. W. B.-S.

TYPHUS.

MILNE (Dorothy K.). **Typhus: its Aetiology and Treatment.**—*Dublin Jl. of Med. Science.* 1914. May. 3rd Series. No. 509. pp. 327–331.

After describing the salient features of a typical case and also adding notes on one or two other cases which came under her care, Dr. Milne proceeds to give a brief summary of recent observations on typhus. In conclusion, it is stated that special treatment should be directed against the toxæmia and low blood pressure arising during the second week, and the author is of the opinion that the early transfusion of normal saline solution is the most satisfactory treatment, and even in two of her worst cases undoubtedly prolonged life.

E. Hindle.

PLOTZ (Harry). **The Etiology of Typhus Fever (and of Brill's Disease). Preliminary Communication.**—*Jl. Amer. Med. Assoc.* 1914. May 16. Vol. 62. No. 20. p. 1556.

L'Étiologie du Typhus. Note Préliminaire.—*Presse Med.* 1914. May 30. No. 43. p. 411.

Some time ago the author investigated six cases of "Brill's Disease" in New York and isolated an anaerobic micro-organism from the blood of five of them; in the single negative case the cultures were made after the crisis. Later, when this disease had been shown to be identical with typhus, the author examined six more cases in New York. In every case the same micro-organism was isolated, whilst a large number of controls gave negative results.

The isolated organism is described as a Gram-positive bacillus, of variable form, about 0.9μ to 1.93μ in length, the breadth being from one-third to three-fifths of the length. It is not acid resistant, nor provided with a capsule; by appropriate methods it is possible to demonstrate the existence of polar bodies. When first isolated the organism is anaerobic, but in successive cultures it can become aerobic. Cultivation on various sugar media (raffinose, maltose, arabinose, galactose, dextrose, saccharose and dextrine) resulted in the production of acid in the media containing maltose, galactose and dextrine respectively.

Fixation of the complement was obtained with the serum of six out of eight cases of typhus, employing as antigen the cultures of this micro-organism.

The reactions were negative during the evolution of the disease, but appeared during and after the crisis. Thirty-six controls gave negative results.

The intra-peritoneal inoculation into guinea-pigs of pure cultures of the organism produced a rise in temperature in the animals after 24 to 48 hours. The temperature continued high during four or five days and then suddenly fell. These phenomena are comparable with those observed after the injection of defibrinated blood from typhus patients; only the period of incubation is shorter in the former case.

The serum taken from typhus patients during convalescence was found to be bactericidal towards the organism, whilst normal serum was without any effect.

E. H.

HORT (E. C.) & INGRAM (W. W.). **The Etiology of Typhus Fever (Preliminary Note).** [Memoranda.]—*Brit. Med. J.* 1914. July 4. pp. 15-16.

The authors briefly record the results of the examination of the blood and urine as well as of the cerebro-spinal fluid in 25 cases of typhus fever during a recent outbreak in Belfast.

A minute organism was discovered in all three liquids. It was found in all the urines, both from the human cases and also from five bonnet monkeys that had been infected by the injection of typhus blood taken from a patient before the crisis. It disappeared from the urine of these infected monkeys after the fever had subsided. The same organism was also found in the lysed deposit of fresh blood taken before the crisis, and also in the cerebro-spinal fluid.

The organism in question appears to be pleomorphic, being cocco-bacillary in form, and the authors refer to it as a cocco-bacillus. In fresh specimens it varies between 0.25μ and 0.6μ in its greatest diameter, and in its smaller forms passes through carefully tested Berkefeld filters. It is both Gram-positive and Gram-negative in the same preparations.

An exactly similar, but much larger, cocco-bacillus was also found in the fresh blood and urine of the same cases. This organism grows well on laboratory media, and is considered by the authors to be identical with those described by DUBIEFF and BRUHL, WILSON of Belfast, FUERTH, MÜLLER, MARCUS RABINOWITSCH, PREDTJETSCHENSKY and, finally, PLOTZ (see above). On injection of these organisms into monkeys the authors produced no fever or other pathogenic effects, and therefore they consider it as of only secondary importance.

E. H.

USSHER (C. D.). **An Epidemic of Typhus Fever in Van, Turkey.**—*Med. Record.* 1914. Sept. 19. Vol. 86. No. 12. [Whole No. 2289.] pp. 509-510.

During the past two years typhus has been making terrible ravages among the soldiers of the Van, Bitlis, and Erzeroum valleys. Many thousands have died and the disease has not been confined to the soldiers, although its spread amongst the general populace has been very limited and the mortality much less than among the former.

The author studied an epidemic that broke out among the soldiers in Van where, out of 4,500 soldiers, 19 officers and more than 2,500 men succumbed to the infection, the case mortality among the soldiers being over 75 per cent. Calcium sulphide was administered to some cases, 1-2 grain pills every half hour, but although at first favourable results were obtained, later experiences were unsatisfactory. Nevertheless, the author states that there has been a distinct benefit from its use. In some cases with very violent delirium an intravenous injection of 0.6 gm. neosalvarsan seemed to help materially.

According to the author the evidence in support of the view that lice only are responsible for the transmission is overwhelming, for not a single case of hospital infection occurred, although the nurses were continually exposed to every other form of contagion from the breath, desquamation, discharges, etc. One of the male nurses placed some infected body lice on himself, and became infected with typhus after an incubation period of about five days.

E. H.

SERGEANT (Edm.), FOLEY (H.) & VIALATTE (C.). *Sur des Formes Microbiennes Abondantes dans le Corps de Poux infectés par le Typhus Exanthématique, et toujours Absentes dans les Poux Témoins, non Typhiques.*—*Compt. Rend. Soc. Biol.* 1914. June 19. Vol. 77. No. 21. pp. 101-103.

The authors have found coccobacillary forms in the organs of lice infected with typhus and not in the bodies of lice that had fed on normal persons or relapsing fever patients.

These coccobacilli in Giemsa stained preparations have always their two poles coloured more intensely than the median part. Their dimensions vary, as a rule, from 1.2μ to 2.5μ in length, but occasionally they may measure as short as 1μ or as long as 3μ . The diameter is usually about 0.5μ to 0.8μ . The small forms are often disposed in pairs.

These forms are much more abundant in the fluid contents of the gut than in the organs; they may be found in all stages of the lice.

The resemblance of these louse forms to the various coccobacilli described from the blood and organs of typhus patients is then pointed out and, if not the actual disease agents, they must be regarded as organisms which accompany the true agent.

E. H.

JABLONS (Benjamin). *Serological Investigations in Typhus exanthematicus.*—*Jl. of Med. Research.* 1914. May, Vol. 30. No. 2. (New Series Vol. 25.) Whole No. 144. pp. 131-139.

The author was bacteriologist to the Morava division of the Serbian Army, and during the Balkan War had the opportunity of examining a number of patients infected with typhus and making various complement fixation reactions.

The examination of the sera from 29 patients shows (1) that the sera of patients infected with typhus give the Wassermann complement deviation test as observed in syphilis, yaws, leprosy, relapsing fever, scarlet fever and malaria; (2) this reaction need not be carried out with typhus organ extract; since the components that give the Wassermann test in syphilis also give it in typhus, therefore the reaction is not specific for the latter disease.

The absence of a positive Widal agglutination test in the presence of an epidemic was found to be of value in diagnosing this infection.

Numerous attempts to cultivate bacteria from the blood of typhus patients gave negative results, and the presence of the Wassermann complement deviation test points to the fact that the cause of the disease is to be sought for amongst the class of protozoan organisms.

These results do not confirm MARKL's statements concerning the value of complement fixation tests for the diagnosis of typhus.

E. H.

JOB (E.) & SALVAT (J.). **Typhus Exanthématique et Bacille Paratyphique B.**—*Bulls. et Mém. Soc. Méd. des Hôpit. de Paris*. 1914. June 18. 3 ser. 30 Ann. No. 21. pp. 1027-1029.

It is well known that the paratyphoid bacillus B may pass into the blood during various diseases, and the authors were able to find this same bacillus in the blood of two out of a hundred patients at Casablanca (Morocco) who suffered from attacks of typhus.

This organism is not considered to have any relation with typhus, and as infection with paratyphoid B is very widespread in Morocco, it is not surprising that it should occasionally be found as a saprophyte during the course of such a serious disease as typhus.

E. H.

YAWS.

BREITENSTEIN (H.). *Ist die Framboesia tropica Syphilis?* [Is Yaws Syphilis?]*—Dermatol. Centralbl.* 1914. Mar. Vol. 17. No. 6. pp. 162-167. With 2 text figs.

The author, who has observed numerous cases of yaws in his long practice in the East Indies, gives an excellent review of the relation between yaws and syphilis. Amongst the differences between the two, it is stated that dogs, cats, and mules are naturally susceptible to yaws and the author records an outbreak amongst his fowls at Banda. The infected birds first showed a papilla on the upper margin of the orbit. This lesion soon involved the whole orbit, and the fowls generally died within one to two weeks. [The reason for regarding this infection as yaws seems very uncertain.]

The statement that yaws is never acquired through coitus is one which is open to question, although all observers agree that this is not the usual method of infection.

The author agrees with the generally accepted view that yaws is a disease *sui generis*, and proposes for it the name of "Syphilis of the Tropics."

[It is surely unnecessary to propose yet another name for yaws, as the appropriate term, *Framboesia tropica*, is now in general use.]
E. H.

DEGORCE (A.). *Sur une Variété de Pian proche de la Syphilis.*—*Bull. Soc. Med. Chirurg. de l'Indochine.* 1914. July. Vol. 5. No. 7. pp. 306-313. With 2 coloured plates.

In one or two districts in the neighbourhood of Hanoi it has been noticed that there are yaws centres in which the symptoms of the disease closely resemble those of syphilis, and in 1912 the author, in conjunction with MOUZELS, described some of these cases (see this *Bulletin*, Vol. 1, p. 140). The present article is concerned with a further account of the infection, derived from the examination of numerous subsequent cases.

The Annamite variety of yaws resembles that of Ceylon, described by CASTELLANI and CHALMERS, and is very different from the African or American forms of the disease. The author considers the general features of yaws in the neighbourhood of Hanoi, and compares them with the principal manifestations of syphilis in the same districts.

The results are given in the form of a comparative table:—

Syphilis.

(1) Primary lesion infiltrated and indurated, with flat and smooth surface, ordinarily situated on the genital organs; often accompanied by abundant lymphadenitis. Phagedaenic processes frequent.

(2) Roseola present.

(3) Secondary cutaneous lesions papular from the first, dark red, infiltrated and fairly regularly scattered.

(4) No abundant lesions of the framboesia type.

(5) Circinate lesions with pink edges, slightly raised, with fine scales.

(6) Seborrhoeic syphilides on the face.

(7) Cutaneous lesions do not itch.

(8) Perionychia present.

(9) In syphilis alopecia, rather the exception.

(10) Lesions in the buccal and pharyngeal mucosa are not numerous and are slight in degree. Erythema of the soft palate and pharynx occurs. Mucous patches. Ulcers of the lips and at the angles of the mouth.

(11) In the glans, prepuce or vulva, the lesions are more or less typical mucous patches.

(12) Moist condylomata at the margin of the anus.

(13) Secondary lymphadenitis present.

(14) Tertiary lesions frequent, attacking chiefly the bones of the nose and palate, the limbs and sternum; or multiple gummata in the muscles, connective tissue and the skin.

(15) *Treponema* present in the lesions.

(16) Wassermann reaction positive.

Yaws.

(1) Primary lesion of soft consistency, or very little infiltrated, with granulating or pimply surface, situated almost invariably extra-genitally, resembling the secondary lesions. Lymphadenitis not marked. No phagedaena.

(2) Roseola resembling that of syphilis, but rarer.

(3) Secondary cutaneous lesions at first in the form of conical elevations of a light red colour, not infiltrated at base, appearing in close groups. The lesions are similar to those of syphilis, namely, on the scalp in the form of encrusted papules; on thin-skinned regions in the form of ulcerating papules, and in the case of the palm of the hands and plantar surface of the feet, in the form of simple papules.

(4) Papillomata (or wart-like growths) of the framboesia type.

(5) Circinate lesions with the edges more raised than in syphilis, covered with yellow crusts.

(6) On the face, lesions of the same type, but more striking and with irregular projections.

(7) Cutaneous lesions do itch.

(8) Perionychia similar to that of syphilis, but occasionally giving rise to pimply lesions.

(9) Alopecia has not been described.

(10) Lesions in the buccal and pharyngeal mucosa often absent. No erythema. No typical mucous patches. Sometimes fissures at the angle of the mouth. The typical lesions are raised, pure white, and occasionally covered with intact epithelium.

(11) Lesions with prominent edges or even pustular with yellowish crusts, occasionally also ulcerations resembling mucous patches.

(12) Similar condylomata, but larger and more raised.

(13) Secondary lymphadenitis as in secondary syphilis.

(14) Tertiary lesions quite exceptional. (One case recorded of a hypertrophic osteitis of the radius.)

(15) *Treponema* present, similar to that of syphilis.

(16) Wassermann reaction positive.

ANNALES D'HYGIÈNE ET DE MÉDECINE COLONIALES. 1914. Apr.-May-June. Vol. 17. No. 2. pp. 605-607. **Traitement du Pian à l'Hôpital Indigène de Ha-Dong. Extrait du Rapport Annuel de 1912.** [Clinique d'Outre-Mer.]

Thirty-three patients suffering from yaws—including 11 men, 11 women and 11 children—were treated at the Ha-Dong Hospital during 1912. The lesions could be cured by treatment with iodine, but the most satisfactory results were obtained when "606" was employed. Particulars are given of two cases which were treated successfully by intravenous injections of that medicament.

E. H.

SCHERSCHMIDT. **Verunstaltungen einer Hand infolge Späterscheinung von Frambösie.** [Deformity of the Hand as a late Symptom of Yaws.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Jan. Vol. 18. No. 2. pp. 66-67.

In the province of Langenburg, German East Africa, yaws seems to be terribly prevalent, for the author found 1,759 cases in the first six months of his arrival there and 447 new cases occurred in the second half year. Many tertiary cases were observed, and among others that of a negro woman who presented rather unusual lesions. Her right forearm showed many scars from the elbow downwards; her wrist was swollen, immovable, and contracted at right angles to the forearm. In addition, the fingers were so deformed that the nails were the only recognisable features. This patient was injected with 1 c.c. of a 10 per cent. solution of mercuric salicylate and showed some improvement, but she died five days later, probably of an intercurrent infection. A similar case was also observed in a man, whose symptoms improved after a similar injection. In this district the native name for yaws is Mbenga.

E. H.

COLLIN (L.). **Le Pian ou "Tonga" aux Iles Loyalty.**—*Bull. Soc. Path. Exot.* 1914. Mar. Vol. 7. No. 3. p. 180.

The endemic yaws previously observed in these islands seems to be assuming very grave proportions, especially in Lifou. The children are most liable to the disease, and in some villages more than half of them are covered with eruptions. Although yaws is generally considered a benign infection, yet, according to the author, it is one of the principal factors causing the large infantile mortality.

Lifou is gradually being depopulated as a result of the prevalence of yaws and other infections following it, and strict prophylactic measures are urgently needed in the island.

The author was on a vaccination tour (against variola) and notes that, in opposition to the views of certain authors (NEEB, KEELAN), vaccination has no effect whatever on the course of the disease in yaws.

E. H.

DE FREITAS CRISSUIMA (E.). **Bouba.**—*Trans. xvii Intern. Congress of Med.* London. 1913. Sect. xxi. Trop. Med. & Hyg. Pt. 2. pp. 191-194.

The term "bouba" has been applied by the natives of Brazil to all ulcerous affections of the skin and mucous membranes, and the author calls attention to the necessity of restricting its application to yaws.

This disease was probably introduced from Africa during the slave trade, and since the abolition of this trade and the improvements in the conditions of labourers that followed, yaws has diminished considerably in its severity.

The author then proceeds to give a detailed account of the clinical symptoms of the disease in Brazil, and points out that it agrees in every respect with yaws as it occurs elsewhere. BREDA's view that bouba was a distinct affection, called by him Brazilian bouba, is shown to be erroneous, for the patients examined in Italy by this observer presented other lesions not due to bouba, and these were supposed to be the result of the bouba.

E. H.

DA MATTA (Alfredo A.). **Boubas** (*Framboesia tropica*).—*Revista Med. de S. Paulo*. 1913. Sept. 15. Vol. 16. No. 17. pp. 314-316.

The author commences with a historical account of yaws in Brazil and quotes the work of one of the early Catholic fathers, Ivo d'EVREUX who in 1613 described the presence of this disease in Brazil. In addition, there is a statement in André THEVET's *France Antartique*, published in 1558, suggesting that the disease was known even in those days.

The author then gives an account of two cases from the Rio Yaco, both of which were badly infected with yaws. After a rectal injection of 0.45 gm. neosalvarsan, one patient showed improvement in his condition four days later resulting in cure on the eighteenth day, whilst the other improved on the sixth and was cured by the thirty-ninth day. Ten months later the patients were still healthy and showed no signs of the infection.

E. H.

CLARK (H. C.). **A Case of "Ringworm Yaws" in a Barbadian Negro.**—*Jl. Cutaneous Diseases including Syphilis*. Jan. 1914. Vol. 32. No. 1. [Whole No. 376.] pp. 18-20. With 1 plate.

The author remarks that there is considerable difficulty in differentiating syphilis and yaws when the latter is not seen in the full bloom of its secondary eruption. The Wassermann test was performed on nine yaws patients at Ancon Hospital, and five gave a positive and one a partial reaction, whilst four were negative; similar inconstant results have been obtained elsewhere, and therefore "one is left the clinical history, observation and demonstration of *Treponema*

pertenuis upon which to establish a diagnosis, and these are quite sufficient in most cases."

The author then proceeds to describe secondary circinate lesions which have been seen in a number of the yaws patients in the Canal Zone. Therefore the presence of these annular or circinate papular lesions, associated with a positive Wassermann test, cannot always be taken as an indication of syphilis in the negro of the tropics, for these conditions are not infrequently associated in cases of yaws.

Salvarsan was found to be very effective in the treatment of the disease, shortening the stay in hospital to about seven days.

E. H.

MONTSERRAT. Report on the Prevalence of Yaws in Montserrat and of the Effects of Salvarsan thereon. [MS. Reports by MCPHERSON (J. C.), Senior Medical Officer, and HEATH (W. G.), Medical Officer District No. 2. Dated Montserrat. 31st Oct. 1913.]

Dr. Macpherson states that yaws was more common a few years ago than it is at present. It is a disease associated with poor surroundings and bad feeding, and the improved conditions of life would account for a decrease in the number of cases. At present most of the cases observed are those in the chronic or ulcerative stage with a history of several years' duration. The incidence of yaws in Montserrat is estimated at about 5 per cent. of the total population and may be very mild—only showing as a "crab-pox" on the sole, or the granulating sores may be numerous and diffuse. It is in the treatment of the latter cases that salvarsan has given the most striking results. Ulcers which had resisted every form of treatment for years were healed in a few weeks after one or two injections. Particulars are then given of the history of 10 patients. In all 22 were treated with uniformly good results, in every case the ulcers and sores drying up within three or four weeks. Children of 10 to 12 years were given 0.3 gm. intramuscularly and other ages in proportion. No serious symptoms were produced in any of the cases.

Dr. W. G. Heath contributes a report on the treatment of 13 cases, eleven of which were "chronic ulcerations due to syphilis or yaws probably," by intramuscular injections of salvarsan. In all the patients the drug was followed by a rapid and certain recovery, and in no case were any alarming symptoms observed after the injection.

E. H.

GROTHUSEN. Salvarsanbehandlung der Frambösie. [Salvarsan Treatment of Yaws.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Jan. Vol. 18. No. 2. p. 67.

The author is stationed at Kilwa, German East Africa, and has treated 16 cases of yaws in that district with salvarsan. Nine of the patients were injected intramuscularly and seven intravenously; the first five with neosalvarsan and the others with salvarsan.

In every case the action of the medicament was wonderful; the day after an injection, or at most two days later, the eruptions began to disappear and after four or five days the patients were cured, although

naturally large scabs took a longer time to heal. The action of the drug was equally well marked in all three stages of the disease.

A single injection of salvarsan does not always prevent relapses, for a child that was injected in November, 1912, suffered from a relapse in February, 1913, which however was cured by a second injection.

E. H.

GIRLING (E. C.). **The Treatment of Yaws and their Sequelae by Means of Salvarsan.**—*Jl. Trop. Med. & Hyg.* 1914. July 1. Vol. 17. No. 13. p. 193.

Working at Bolobo, Belgian Congo, the author has treated about fifty yaws patients at various stages of the disease, and in every case recovery has been rapid and complete. As a general rule 0.01 gm. of salvarsan per kilo body weight of the patient was administered intravenously, but 0.0075 gm. per kilo was also sufficient, and in small children the drug was injected into the muscles of the gluteal region. The patients experienced relief within 48 hours, and the eruption was dry within a week and disappeared by the end of fifteen days.

Two patients that had been unsuccessfully treated for years with injections of atoxyl and tartar emetic were cured after single injections of salvarsan.

[In giving the dose employed, owing probably to a printer's error, 0.075 gm. is written instead of 0.0075 gm. per kilo.]

E. H.

HARPER (Philip). **Treatment of Yaws by Intravenous and Intramuscular Injections of Salvarsan and Neosalvarsan.**—*Lancet.* 1914. Aug. 8. pp. 370-372.

The author states that every Fijian native who does not die in infancy contracts yaws, usually at about the age of two years. The mortality from it is enormous, and its sequelae and complications are the chief causes of the excessively high death-rate among all ages of Fijians.

The author has treated 90 cases of yaws with injections of either salvarsan or neosalvarsan and obtained excellent results. The drug was administered by intravenous injection in 17 cases, and by intramuscular or subcutaneous injections in the remaining 73, and the dose varied from 0.1 gm. neosalvarsan in the case of a baby 10 months old, up to 0.6 gm. of salvarsan, or 0.9 gm. of neosalvarsan, for an adult male Fijian weighing well over 160 lb. One death was observed, probably due to an overdose of salvarsan; the patient, a woman, received 0.6 gm. intravenously. With the exception of this case, one treated by "blister serum," and another case which was much improved, though not completely cured, all the cases were apparently cured. The author is of the opinion that salvarsan is the preferable drug to use in hospital treatment, and neosalvarsan if patients have to be treated in their villages or at an out-patient dispensary.

E. H.

LE ROY DES BARRES. *Traitement du Pian par le Ludyl.*—*Bull. Soc. Med. Chirurg. Indochine.* 1914. May. Vol. 5. No. 5. pp. 186-194.

Ludyl, or 1151, was discovered and studied by MOUNEYRAT at the same time as galyl (1116) and has given good results in the treatment of syphilis, relapsing fever and trypanosomiasis. The author decided, therefore, to test its effect on cases of yaws, especially as he had previously obtained good results with galyl.*

The substance was dissolved in 15-20 cc. of distilled water and then filtered. As the solution is unaffected by light, enough for about ten injections was generally dissolved at the same time. For adults the author administered a first injection of 0.4 gm. of the substance and, after an interval of eight days, a second injection of 0.5 gm. As a rule the injection was administered intravenously and before meals. The reaction following an injection was much less intense than that after neosalvarsan or salvarsan; it was also rather less than the reaction provoked by an injection of galyl. Out of 25 intraveous injections, a rise in temperature was observed in 14 cases. Other reactions observed were headache—which occurred as frequently as the fever; vertigo, 2 cases; and diarrhoea, 1 case. The urine was never affected.

In every case ludyl had a very marked effect on patients suffering from yaws. The second day after the first injection the papules began to fade away, and dry up, and by the time of the second injection, eight days later, in the majority of cases all the lesions had completely disappeared.

Particulars are then given of 14 natives of Indochina suffering from yaws who were treated with this compound. From the results there can be no doubt of its efficacy in this disease and, as the author remarks, it is to be preferred to galyl because its administration is followed by a slighter general reaction.

E. H.

BAYMA (Theodoro). *A Emetina na Framboesia Tropica.*—*Rev. Med. de S. Paulo.* 1913. Sept. 15. Vol. 16. No. 17. pp. 311-314. With 5 figs. Also published separately—15 pp. With 4 figs. 1914. Sao Paulo: Typographia do Diario Official.

The author records a case of mixed infection with yaws and syphilis occurring in a soldier who had lived in San Paulo for three years. *Treponema pertenue* was found on examination of some of the ulcers and the Wassermann reaction was positive. Attempts to infect monkeys by the injection of material from ulcers containing numerous spirochaetes gave negative results.

Five injections of .01 gm. of emetine were then administered subcutaneously and the yaws symptoms disappeared whilst at the same time the syphilitic ulcers healed up. The patient eventually left the hospital apparently cured of yaws, but was still infected with syphilis as his blood gave a positive Wassermann reaction. Photographs are given showing the appearance of the patient before and after treatment.

E. H.

* Sur l'Emploi de Galyl dans le Traitement du Pian.—*Paris Clinique et Therapeutique.* 1913. No. 29.

RANKEN (H. S.). **A Preliminary Report on the Treatment of Human Trypanosomiasis and Yaws with Metallic Antimony (Plimmer).**—*Proc. Roy. Soc.* 1913. Mar. 6. Vol. B 86. No. B 586. pp. 203-215 and *Jl. R. Army Med. Corps.* 1913. Sept. Vol. 21. No. 3. pp. 261-281.

The author in the Sudan treated ten cases of yaws by intravenous administration of metallic antimony. He says that to an adult in fair condition $1\frac{1}{2}$ grains should be given as a first dose and repeated twice with intervals of four days. Two grains may be given if the patient takes the drug well. Three doses, he considers, is a sufficient course of treatment, but in the majority of his cases a fourth was given to ensure a permanent result. The antimony is administered as in the case of trypanosomiasis (see this *Bulletin*, Vol. 1, p. 663). Notes are given of each case. The lesions were characteristic of the various stages of yaws, "from minute vesico-pustules up to confluent crusted lesions, rupoid patches with limpet-shell crusts, or late plantar ulcers." *Spirochaetes* were found in each case. The treatment was uniformly successful. There are no notes of the ultimate results, which, had he had the opportunity, the author would doubtless have recorded.

A. G. B.

SLEEPING SICKNESS.

CHALMERS (Albert J.) & O'FARRELL (W. R.). Sleeping Sickness in the Lado of the Anglo-Egyptian Sudan.—*Jl. Trop. Med. & Hyg.* 1914. Sept. 15. Vol. 17. No. 18. pp. 273-284. With a map and 5 charts.

This paper is the first of a series of short notes which, it is hoped, will be published on sleeping sickness in the Anglo-Egyptian Sudan. By way of introduction, the author gives a short review of the various trypanosomes which have been described in man. The countries which adjoin the Lado Enclave, and are known to be infected with sleeping sickness, are the Belgian Congo and Uganda. The author gives an account of the history of human trypanosomiasis in these countries.

The Lado, of which there is a sketch map, is inhabited by numerous small tribes which had little communication with one another until the advent of the white man's rule. The sleeping sickness areas are outlined on the map, as is also the distribution of *Glossina palpalis* and *Glossina morsitans*.

Two monkeys and a dog inoculated from sleeping sickness patients were taken to Khartoum. On examination, only one monkey was found to be infected. This strain (the Yei strain) was examined in great detail. A biometric chart is given; the length of the trypanosome was found to vary from 18 to 36μ and the breadth from 1 to 2.5μ . The average length was 25μ . Posterior nuclear forms have never been found. The pathogenicity of the trypanosomes was examined in dogs, cats, rabbits, gerbils, jerboas, white rats and monkeys, and was found to be distinctly less than that of *T. rhodesiense*, but more marked than that recorded for *T. nigeriense*. In the dog the average length of life was more than 40 days and often several months. In the monkey the average duration of the disease was 35.5 days, while in the gerbil it was 14.6 days.

Various serological tests were undertaken with a view to distinguishing this trypanosome from *T. rhodesiense*. The serum of a dog fully immune to the Yei strain destroyed that trypanosome in 20 minutes in vitro, but had no effect on *T. rhodesiense* after one hour. Partially immune serum was mixed with the Yei strain and injected into a gerbil. An infection resulted from which the animal was recovering when it died of heat stroke 39 days after inoculation. On the other hand the same serum mixed with *T. rhodesiense* resulted in an infection which killed the animal on the 7th day. A similar experiment with completely immune serum was not very satisfactory, as the animal inoculated with the Yei strain was accidentally killed 2½ days after inoculation; no trypanosomes were found in the blood or internal organs. The animal inoculated with *T. rhodesiense* died in ten days. Various cross immunity experiments were performed; these are to be described in a subsequent paper. As regards the effect of normal human serum, the author writes that the results of his experiments may be summarised briefly by saying that "no trypanolysis worthy of record took place with two strains of mule trypanosomes, with *T. rhodesiense* or with the trypanosome from Yei."

No experiments were made regarding transmission of the parasite ; there is no reason to doubt that it is spread by *Glossina palpalis*. The authors compare the Yei strain with various other human trypanosomes which have been described, e.g. *T. rhodesiense*, *T. nigeriense*, *T. gambiense* (Congo strain), *T. gambiense* (Uganda strain). Their conclusions are :—

"We consider we have brought forward sufficient evidence to show that the trypanosomes which we found in the infected animal sent by Captain RANKEN, R.A.M.C., and the Congo strain are the same, and that in all probability they and the Uganda strains are also the same. There being no data, that we know of, to compare these strains with *T. gambiense* Dutton, 1902, we are of the opinion that, at all events, provisionally it would be safer to keep the name '*Trypanosoma castellanii* Kruse, 1903,' for these strains until more light is thrown upon the complicated problem of 'What is *T. gambiense* Dutton, 1902 ?'

"It would appear to us as though the sleeping sickness of Africa could be divided into the following categories :—

"(A) *Southern sleeping sickness* caused by *T. rhodesiense* Stephens and Fantham, 1910, and spread by *Glossina morsitans* Westwood, 1850.

"(B) *Equatorial sleeping sickness* caused by *T. castellanii* Kruse, 1903, and spread by *G. palpalis* Robineau-Desvoidy, 1830.

"(C) *Northern sleeping sickness* which may be caused by as yet imperfectly known trypanosomes named :

"(a) *T. gambiense* Dutton, 1902,

"(b) *T. nigeriense* Scott-Macfie, 1913, and perhaps also by some as yet unknown trypanosomes."

W. Yorke.

INGRAM (A.). Report on Occurrence of Human Trypanosomiasis in the Northern Province of Ashanti. Received in Colonial Office, 9th July 1914.

The author gives an account of the physical configuration and vegetation of the Northern Province of Ashanti. The total area is not more than 7,500 square miles. Dense forests are met with along the rivers and large streams ; elsewhere the forest is of the savannah type. Large stretches of grass country are also found, chiefly in the Mo district, where trees are practically absent.

The distribution of the different tsetse flies varies with the type of vegetation. *G. palpalis* is found everywhere in forests of the denser type, *G. tachinoides* only in the thick growth along the large rivers. *G. longipalpis* is the fly most commonly taken in the savannah forest, and as this type of forest is most general, it is the fly which is most universally distributed. *G. submorsitans* is common in the Mo district. *G. pallicera* occurs only in the dense forests on the banks of streams, and never far from water. It is one of the rarer tsetse flies, but is a voracious blood sucker. *G. nigrofusca* seems to favour the outskirts of dense forests where it has given place to savannah forest. *G. medicorum* was met with in the savannah forest.

In view of the observations of KINGHORN and YORKE, that temperature plays an important part in the bionomics of tsetse flies and in the development of trypanosomes in them, the author describes briefly the main climatic conditions prevailing in Ashanti. Tables are given showing the maximum and minimum shade temperatures and relative humidity for each month during the years 1910-1913. In another table the monthly rainfall at Krachi for the year 1913 is given.

The population of the Northern Province amounted in 1911 to 39,962. The chief pursuits of the inhabitants are agriculture and weaving. A certain amount of cattle rearing is undertaken and small quantities of cacao and rubber are grown. This province is not a producer of rubber and kola nuts like the neighbouring Western Province; possibly, as the collection of rubber and kola nut farming entail work in the haunts of *G. palpalis*, this is one of the reasons why human trypanosomiasis is more marked in the Western than in the Northern Province.

Gland palpation and puncture was the principal method of examination adopted. Occasionally, when the glands were found to be too small to permit of puncture, examination of blood films was made. In all, 18,767 people were examined, and in 34 trypanosomes were found. This gives a percentage of 0.18 for the whole Province. A table is given showing the distribution of the cases in the various districts.

Concerning the sex and age of the persons infected, the author's observations, given in the following table, support those of TODD [see this *Bulletin*, Vol. 2, p. 255]. The majority of cases of trypanosomiasis are of middle age, hardly any of them being elderly persons, but only 4.3 of the examinees were in the "over 45" class.

PERCENTAGE OF CASES INFECTED UNDER EACH AGE LIMIT.

	Under 15.	Over 15.	Over 45.
Males	5.8%	58.8%	2.9%
Females	2.9%	29.4%	0%

The author discusses the question of glandular enlargement and its significance in trypanosomiasis. Of 35 persons showing "+" glands, 34 were punctured and 27 were found to be infected. Of 63 people showing "+ -" glands, 57 were punctured and 5 were infected. Of 2,824 persons showing "+ - -" glands, 22 were punctured and none showed trypanosomes.

With regard to the distribution of cases of human trypanosomiasis in the Province, the author points out that Kintampo and Krachi appear to be the two foci of the disease. Kintampo is the halting-place for traders travelling between Coomassie and the Northern Territories; it is also heavily infested with *G. palpalis* owing to the fact that it is enclosed upon three sides by permanent streams. A considerable amount of clearing has been done, but much bush still remains. Krachi is situated at the junction of the Beresu with the Volta, and is also much infested with tsetse. The number of people seen in the various towns and settlements, and the number of cases of human trypanosomiasis found are recorded in tables. The only part of the country which may be said to be free of tsetse fly is Banda and the surrounding neighbourhood within a radius of about four miles. Places at which various tsetse fly were taken and the dates are recorded.

In his conclusions, the author states that the Northern Province of Ashanti seems to be much less heavily infected with human trypano-

somiasis than the Western. The disease is endemic and has not spread with the same alarming rapidity that it has "on the East coast." Ingram is of opinion that the difference in the virulence of the disease on the two sides of the Continent is due to the difference in the conditions to which the vector is submitted. KINGHORN and YORKE have shown the effects of reduced temperature in retarding the development of *T. rhodesiense* in *G. morsitans*. It is not unlikely that some condition in the bionomics of *G. palpalis* in West Africa is inimicable to its being so efficient a transmitter of *T. gambiense* as it is "on the East coast." Again, judging from the ease with which pupae of *G. palpalis* have been collected on the shores and islands of Victoria Nyanza, *G. palpalis* must be much more numerous around that lake than it is in any colony of West Africa. Furthermore, he writes, big game, which acts as a reservoir, is more plentiful on the east side than on the west. The author states that he considers WADE's theory that the majority of persons found infected with trypanosomiasis are descendants of slaves imported from Northern Territories into Ashanti to be incorrect, because (1) this implies hereditary immunity against the disease amongst pure bred Ashantis; (2) on questioning the people in the Northern Province, one person out of every three will reluctantly admit being descended from a slave.

As women are the hewers of wood and drawers of water, the greater incidence of the disease in the male sex is puzzling.

W. Y.

DANYSZ (J.). *Traitement des Trypanosomiasés par des Composés Arsenicaux combinés avec des Sels d'Argent et d'Antimoine (produits 88² et 102¹).*—*Compt. Rend. Acad. Sci.* 1914. Aug. 24. Vol. 159. No. 8. pp. 452-455.

As a result of his studies (see this *Bulletin*, Vol. 3, pp. 37 & 531) on the compounds of arsenobenzol and metallic salts and on the therapeutic properties of these products, the author has succeeded in combining a certain quantity of trichloride of antimony with arsenobenzol bromo-argentique. The formula given for the product obtained is $[C^{12}H^{12}O^3N^3As^2]^2AgBrSbO(H^2SO^4)^2$; it is referred to as 102¹.

A record is given of a series of experiments performed to ascertain the therapeutic effect of the compound on mice infected with trypanosomiasis. In Experiment I, six mice were inoculated with *T. evansi*. Five of them received, 48 hours later, a subcutaneous injection of the drug 102¹; the amounts given were respectively .02, .04, .05, .08 and .1mgm. The sixth mouse served as a control and died five days after inoculation. In the first two mice the trypanosomes disappeared from the blood, but relapses occurred and the animals died on the 10th and 15th days. The third, fourth and fifth mice were cured. Experiment II was similar, except that the mice were infected with *T. gambiense*. In this case the control animal died on the 6th day, whilst the animal which received the smallest dose of the drug died on the 20th day. The other four mice were cured. Experiment III was similar to Experiment II, except that the animals

were treated on the 4th day after inoculation. The control animal died on the 6th day. Two mice which received .02 mgm. of the drug died on the 12th day, whilst those which had received .04 and .06 mgm. died on the 20th day. The other two recovered.

The lethal dose of the drug for mice of 20 gm. is 5 mgm. The largest dose tolerated is 80 times the curative dose for *T. evansi* and 100 times that for *T. gambiense*. The author remarks that the addition of antimony to the product 88² gives rise to the product 102¹, which is specially active in the case of *T. gambiense* infection.

Danysz has been able to confirm these results on rabbits infected with *T. evansi*. He found that a dose of 10 gm. per kilo. of body weight readily cured rabbits infected with surra. The products 88² and 102¹ should be given exclusively intravenously, as injected subcutaneously they are absorbed with difficulty and produce severe lesions in the rabbit and guinea-pig.

W. Y.

PEARSON (Karl). On the Probability that Two Independent Distributions of Frequency are really Samples of the Same Population, with Special Reference to Recent Work on the Identity of Trypanosome Strains.—*Biometrika*. 1914. Apr. Vol. 10. No. 1. pp. 85-143. With 14 diagrams.

This paper is of a somewhat technical nature. Those interested should consult it in the original. The author divides his investigation into the following four parts:—

"(i) The probability of identity of the strains on the evidence presented in the reports of the Commission of the Royal Society, Nyasaland, 1912.

"(ii) The probability that the host or the animal in which the trypanosome is cultivated makes essential differences in the distributions of frequency.

"(iii) The probability that the strains are alike after allowance has been made for the host.

"(iv.) The nature of the heterogeneity which is statistically demonstrable in the bulk of trypanosome measurements."

The conclusions are:—

"(i) If appeal be made to statistical measurements, judgment between identity and diversity of strain must be formed by means of accepted statistical processes and not by mere comparison of graphs.

"(ii) Statistical processes show that the conclusions already formed as to the identity of trypanosome strains from mere inspection of the graphs cannot be confirmed.

"(iii) There must be some standardised process of treatment both in regard to host, and to method of and stage of infectivity at extraction.

"(iv) Even making allowance for differences due to host and treatment, we find remarkable divergences in the very strains asserted to be identical.

"(v) It would appear that some order would be brought into the chaos, if we could consider the strains described as *T. brucei*, *T. rhodesiense*, *T. gambiense*, the wild game, the Mzimba, and very probably the tsetse fly and the human strains as really consisting of two components, which for the time I have termed *T. minus* and *T. majus*. It is highly desirable that additional measurements should be made (! a nuclear index ascertained) to determine whether these lead also to similar components.

"I do not assume that this is a final solution of the problem, nor do I assert that *T. minus* and *T. majus* represent necessarily, although probably, distinct strains; they may be dimorphic forms of one and the same strain occurring in different proportions. But I believe that the suggestion of their existence may help to explain some anomalies of the present chaos. I ought also to state quite frankly that this paper is not written in a merely critical spirit. I believe that the trypanosome workers have undertaken in their elaborate systems of measurements most laborious and most valuable work, but, I think, the time has now come when without trained statistical aid but little further progress will be made in a very important and urgent matter."

W. Y.

OWEN (George E.). **Mechanical Transmission in Trypanosomiasis.**—*Jl. Comparative Pathology & Therapeutics*. 1914. Sept. Vol. 27. Pt. 3. pp. 259-260.

The author states that between 1908 and 1913 some 2,500 to 3,000 head of cattle died from trypanosomiasis in the Barotse reserve of Northern Rhodesia, though it is free from *Glossina morsitans*. The mortality began each year in February and practically ceased after June. December to March are the months when flies are most numerous. Horses, dogs, sheep and goats are found in the district, but no case is known to have occurred amongst them; however, all these animals could be infected by inoculation. It was noticed that trypanosomiasis was definitely confined to certain herds, others grazing over the same ground being free. In 1912 the author was sent to investigate, and kept 800 head of cattle without loss through 1913. The animals were carefully watched for six months after the fly season, all those infected or suspected being removed before the flies again became numerous. During the heat of the day, when Tabanidae are numerous and most active, the cattle crowd together for mutual protection, and circumstances are very favourable for mechanical transmission. A transmission experiment conducted by the author, in which two healthy cows were kept with two infected ones and grazed together with them, resulted in infection of the healthy cows in four months. The author has come to the conclusion that mechanical transmission took place with Tabanidae as the agent owing to the very favourable circumstances of crowding. The species of trypanosome was not determined.

A. G. B.

SEIDELIN (Harald). **Ingestion of Erythrocytes by Trypanosomes.**—*Parasitology*. 1914. Oct. Vol. 7. No. 3. pp. 226-227. With 1 coloured plate.

While the author was working in the Medical Research Institute, Nigeria, with blood from white rats containing trypanosomes of the *T. brucei* group, he examined a number of stained films, and noted "the presence of some very interesting appearances which seem to suggest the important fact that these trypanosomes are capable of ingesting and digesting erythrocytes." A coloured plate shows twelve drawings taken from a specimen six days after intraperitoneal infection. "They show that the parasite encircles the erythrocyte, which gradually becomes enclosed in its protoplasm, probably in a

sort of vacuole which develops between the two nuclei." The author suggests that the vacuoles observed in certain trypanosomes may be of a similar nature. He states that these observations indicate a certain resemblance to the nutrition conditions obtaining in the case of amoebae and other protozoa.

A. G. B.

JACK (Rupert W.). **Tsetse Fly and Big Game in Southern Rhodesia.**—*Bull. Entomol. Research.* 1914. Sept. Vol. 5. Pt. 2. pp. 97–110. With 2 maps.

The author writes that in Southern Rhodesia the conditions are better than in most parts of Africa for gathering information about the distribution of tsetse flies in the past, and perhaps even in the present. This is because only one species of tsetse (*Glossina morsitans*) is found, and there is a relatively large European population, a more reliable source of information than the native. During the last four and a half years he has visited the great majority of fly-belts in Southern Rhodesia, and the results of his observations are to the effect that in most cases game is more or less abundant all the year round in fly-infested country and that in no instance is the larger animal life altogether absent even during part of the year. In a particular locality, where fly appeared to be abundant in the absence of game at a certain season, it was shown that warthog and duiker were present, and at other times of the year many other species of game. He sums up the evidence in favour of the necessity of big game to tsetse in Southern Rhodesia under four heads:—

"1. Tsetse retired before the advance of civilisation in the Transvaal, the only known modification of conditions being the destruction of the game.

"2. Tsetse disappeared from large tracts of country immediately after the rinderpest epizootic in 1896.

"3. Tsetse has increased and spread since the rinderpest only in those parts of Southern Rhodesia where big game has increased.

"4. Tsetse has greatly decreased of late years in the Hartley district, in those parts where the big game has been most effectively destroyed or driven away."

The author proceeds to discuss these four heads. He points out that the wholesale destruction and driving away of the larger fauna was for many years the sole modification of natural conditions due to the advent of the European; clearing came later. A map shows the areas from which tsetse disappeared at the time of the rinderpest, the approximate range of tsetse between 1896 and 1900, and its range at the present day. In a foot-note Mr. Guy MARSHALL and Mr. SELOUS, who has examined this map, point out from personal knowledge that in some of the first-named areas, including the largest, there was no tsetse for some years before the rinderpest. For the rest of the arguments in this interesting paper the original must be consulted. A second map shows the increase in recent years of *G. morsitans* in the Sebungwe district.

A. G. B.

LEPROSY.

BARBÉZIEUX (G.). *Contribution à l'Etude de l'Histoire de la Lèpre. La Lèpre dans la plus haute Antiquité.*—*Janus*. 1914. Mar.-Apr. Vol. 19. No. 3-4. pp. 132-149.

According to the author, the almost universal opinion of the origin of leprosy is that, starting from Egypt, its first home, the disease was spread by the Israelites, Phoenicians, Assyrians and Persians, first throughout Asia, then throughout Europe, and then to America and Australia in the course of the various migrations of these peoples. Dr. Barbezieux is not prepared to accept this view as final, and suggests that the disease may have had multiple foci of origin throughout the world, affecting all races at such times as their hygienic conditions were extremely degraded. In support of this alternative theory, he has examined the oldest records of many races and find evidence that leprosy was almost universally recognised at the dawn of history. The biblical records, the Rig-Veda and Atharva-Veda, and the most ancient books dealing with China, all are found to contain references to the disease. As the author points out, it is difficult enough to recognise leprosy in certain cases even now, and how much more difficult must it have been in ancient times. But, allowing for this source of error, "some of the lesions described are definitely those of leprosy and can only be attributed to that disease." In conclusion, the author finds in historical records very little to support the hypothesis that the disease is extremely contagious and liable to be spread broadcast by the movements of infected peoples, while on the other hand he sees much to indicate that "leprosy is usually if not always contracted under identical environmental conditions of domicile, food, personal and general hygiene, affecting subjects already predisposed."

[The theory that leprosy is an extremely contagious disease is so rarely held that it is hardly worth attacking. On the other hand, all the evidence adduced by Barbezieux fits in very well with the generally accepted opinion that the disease is only contagious under conditions of such close and intimate contact as obtain where overcrowding, poverty, dirt and ignorance make them inevitable. Why he should seek a further explanation in "predisposition" it is difficult to imagine. There is much to be said in favour of his view that leprosy may have arisen independently in many communities. Until the bacillus of Hansen has been cultivated we shall remain in the dark as to the question whether all strains of human leprosy are identical. What little evidence we possess, chiefly based on the inconstant results of certain lines of treatment in different parts of the world, points rather to the existence of differences in human leprosy strains than to their identity, and such differences, if substantiated, might point to multiple foci of origin.]

S. L. CUMMINS.

KÉRAVAL. *La Léproserie du Terek (Caucase) de 1898-1913.*—*Caducée*. 1914. May 16. Vol. 14. No. 10. pp. 131-133.

Keraval's paper is a resumé of a report by Dr. T. T. HUBERT, the Director of the Leper Asylum at Terek (Caucasus). This Asylum was

founded in 1897, on the right bank of the River Kouma, close to the town of Georgievsk. It has since been enlarged and improved, has been taken over by the Government, and to-day has an efficient staff and accommodation for 60 cases, the upkeep for personnel and hospital services being met by a budget of 15,000 roubles (£1,190) per annum. To those charged with the administration of leper asylums the details of staff, diet, washing and disinfection given in the original article should prove of interest.

Since the opening of the institution 100 cases (58 men and 42 women) have been admitted. During this period of about 16 years, 44 patients have died, nine have quitted the Asylum, six have been cured, and there remain 41 cases (24 men and 17 women) still under treatment. There have been 53 cases of tubercular leprosy, 16 anaesthetic cases and 31 mixed infections. The duration of the disease was varied from 3 to 30 years. The average duration in the 44 fatal cases was 11 years. Eleven cases might possibly be claimed as hereditary, being sprung from infected families, but contagion would seem the more probable explanation even in these. In the remaining 89 there was no evidence of hereditary taint, and in all of them antecedent association with infected persons could be established. In the few cases where the date of exposure to infection could be approximately fixed the incubation period was from 3 to 4 years. The author notes that the onset of the disease is frequently marked by the occurrence of pustules with a more or less severe feverish reaction.

As regards the effect of the disease on the sexual functions, these appear to be retained for a considerable time in nodular, but to be lost early in anaesthetic, cases. It is only during the early stages of the disease that women remain fertile. Of two children born in the Asylum, both were apparently quite healthy. The most frequently noted complications are spasm of the glottis, loss of eyebrows and eye-lashes and affections of the globe of the eye.

In treatment, Chaulmoogra oil, persistently given internally and subcutaneously, has decidedly ameliorated both the local and general symptoms, often appearing to promise a cure, though, as a matter of fact, only one actual cure has resulted from the treatment. Fifteen to 60 drops are given emulsified with milk, the taste and smell being masked by peppermint water. The Anti-leprum of Bauer & Co., a purified oil of Gynocardia, though less disagreeable, is more expensive than, and not so active as, ordinary Chaulmoogra oil. Deycke's Nastin, prepared by Halle & Co., has given encouraging results, provoking a reaction of an intensity varying directly with the gravity of the leprosy lesions. Of the six cases recorded as cured, five had been treated with Nastin. Under this treatment nodes have vanished, old ulcers have healed, beard, moustaches and eyebrows have again started to grow, and 66 per cent. of the cases have gained in weight. It is customary to commence with weekly injections of Nastin B_0 , gradually working up to the stronger preparations, B_1 and B_2 . The author regards leprosy as very definitely a curable disease.

HONEIJ (James A.) & PARKER (Ralph R.). **Leprosy: Flies in Relation to the Transmission of the Disease.** (A Preliminary Note.)—*Jl. of Med. Research.* 1914. May. Vol. 30. No. 2. (New Series Vol. 25.) Whole No. 144. pp. 127-130.

In an attempt to confirm the observations of CURRIE, LEBOEUF, WHERRY and others on the transmission of the leprosy bacillus by means of flies, the authors made systematic experiments on 95 flies, the majority being *Musca domestica* and *Stomoxys calcitrans*. Work was done to ascertain the length of time during which a fly will feed, the average number of excreta deposits and such points, as well as on the ingestion and excretion of bacilli by these insects. It was determined:—

1. That a fly would feed continuously for from 3 to 31 minutes.
2. That the digestive track was completely emptied in from 52 to 72 hours.
3. That *Musca domestica* deposits excreta from 25 to 35 times during 48 hours, the greatest number occurring during the first 24 hours after the feed. *Stomoxys calcitrans* excretes from 40 to 86 times in 61 hours. In both species the female appears to deposit excreta more frequently than the male.

4. The average time between the feeding and the first ejection varies from 5 to 48 minutes, the average being about 13 minutes. The ejections of *S. calcitrans* are larger and darker than those of the other species used.

Turning now to the passage of lepra bacilli in the excreta of flies, in 12 flies of different species, caught in the rooms of patients, two, both *M. domestica*, showed acid-fast bacilli in the faecal deposits. Of six *M. domestica* fed on the lesions of patients none was found to be passing bacilli. Of 21 *M. domestica* fed on the contents of pustules, 15 were negative and 6 positive. Out of 20 *S. calcitrans* so fed, 4 were negative and 16 positive. In these experiments each globule of pus was moistened with sterile water, making it easier of ingestion, and, further, the fly was not disturbed while feeding, so that there was more chance of ingestion than when the flies were fed on leprosy lesions. Only on one occasion did the authors succeed in finding acid-fast bacilli in the vomit-spots (regurgitations) of flies. They note the greater frequency with which *S. calcitrans* appeared to take up the bacilli than *M. domestica*, and draw the rather rash conclusion that the former species is much more likely to play an important rôle in the transmission of leprosy than the latter.

S. L. C.

COUVY. **Bacilles de Hansen dans les Ganglions de Personnes apparemment Saines.**—*Bull. Soc. Path. Exot.* 1914. May. Vol. 7. No. 5. pp. 365-366.

The following case of very high interest was mentioned by Dr Couvy, Director of the Bureau of Hygiene at Grand Bassam, in a letter to MARCHOUX and is communicated by the latter. On a native soldier being found suffering from leprosy, an examination of the persons who had been in contact with him was carried out. His wife, who had lived with him for about a year, was found to be clinically in good health, without rash, anaesthesia, nervous symptoms or any other

sign of the disease. She consented to gland puncture, with the following result. Films from the cervical, epitrochlear, and right and left inguinal glands were found to be free from organisms, but in a film from the pulp of one of the left inguinal glands draining the genital area, a few lepra bacilli were found. The woman is being kept under observation and the evolution of the infection will be watched. Nothing can be found out about the hereditary antecedents of the woman. It is noteworthy that her husband had suffered from a leprosy sore on the genitals (*plaie à la verge*) for six months before his malady was diagnosed. The woman states that she never had a chancre or other genital lesion. Marchoux finds in this case a confirmation of his theory that in human as in rat leprosy the primary lesion is in the lymphatic glands.

S. L. C.

VERGE (Arthur). **Notes on Three Unusual Cases. 1. Hunterian Chancre of the Tongue. 2 and 3. Leprosy.**—*Australasian Med. Gaz.* 1914. Mar. 28. Vol. 35. No. 13. [No. 480]. pp. 272-273.

In describing a case of nodular leprosy in a man of 27 years of age who had lived all his life in a district where no cases of leprosy were known to exist, had suffered from the undiagnosed disease for seven years and yet had not infected his wife or child (aged 3), Dr. Verge points out that to isolate such a case and yet ignore the large number of cases of open tuberculosis is irrational. The fact that popular feeling is against the segregation of tuberculosis cases and in favour of segregation in the much less contagious disease, leprosy, is one of the puzzles of psychology but, accepting the fact as such, the case quoted ought not to be taken as final evidence that no infection has or will occur. The incubation period of the disease is so prolonged in many cases that years may have to elapse before it is certain that the wife and child have escaped infection. The problem of how the patient got infected himself is a difficult one and raises the same questions as the cases quoted by NETTER [see this *Bulletin*, Vol. 3, p. 491] of persons acquiring the disease in France without any known contact with a case of leprosy. No mention is made of bacteriological verification of the diagnosis. The possibility of clinically healthy "carriers" must always be borne in mind in this connection. The second case quoted was one of the macular type and presents no features of exceptional interest.

S. L. C.

BRAULT (J.). **Note sur la Provenance des Cas de Lèpre importés en Algérie.**—*Progrès Méd.* 1914. May 23. Vol. 42. No. 21. pp. 241-242. With 2 figs.

This is a clinical note describing two cases of leprosy seen in the Mustapha Hospital in Algiers. One was a case of the anaesthetic type, with marked atrophic changes involving the fingers and toes. Bacteriological examination of the nasal secretion proved negative. The other was a mixed case with numerous bacilli in the nasal secretion. Both cases had been in Madagascar, where certainly one and probably both became infected.

S. L. C.

LEBOEUF (A.). *Observations Relatives au Traitement de la Lèpre et notamment à l'Action très Favorable exercée par l'Huile de Chaulmoogra chez les Canaques de l'Archipel Calédonien.*—*Bull. Soc. Path. Exot.* 1914. June. Vol. 7. No. 6. pp. 535-548.

The danger of drawing conclusions, as to the success or failure of treatment, from observations confined to a limited number of patients in a disease so subject to spontaneous improvement as leprosy is set forth on his first page by the author. He believes himself to have dealt with a sufficient number of cases to justify an opinion, and the opinion formed is favourable to Chaulmoogra oil, both by itself and in combination with other drugs. The large doses often mentioned as necessary are in reality not required. Leboeuf prefers to use smaller doses, continued for as long as possible, periodical intermission in the treatment being allowed. The oil can be given in one of three forms: in emulsion, as capsules, in salads, etc. Notes on one of many successful cases (exact number not stated) are published in full. This case, an adult Kanaka from one of the islands of the Loyalty Group, suffering from what appears to have been a mixed type of the disease, was completely freed from symptoms by treatment with a spoonful of emulsion of Chaulmoogra oil, once daily, continued from February to October, 1912. He was seen again in 1913 and was still apparently in excellent health.

A serious drawback to the use of Chaulmoogra oil is that samples vary greatly in their efficiency. This is noticed by the patients themselves, who will sometimes complain that a given sample is inferior to one formerly prescribed for them. The author considers the contradictory reports on the value of Chaulmoogra oil as probably depending, on the one hand, on adulteration of the sample and, on the other, on the race to which the patient belongs. The drug can be used in the form of inunctions concurrently with its exhibition by the mouth. For this purpose it may either be mixed with vaseline or made into a pomade by adding two parts of the oil to one part of black soap. The latter preparation may lead in certain cases to intense desquamation, in which case the pure oil or the vaseline must be substituted. The method of intra-muscular injections may be employed where the exhibition of the drug *per os* is not well tolerated, but such injections are absorbed with difficulty and, especially where a large number of patients have to be treated, the administration of the drug by the mouth is to be preferred.

The author has had decidedly encouraging results with potassium iodide. The effect of this drug is very different in individual cases. Leboeuf divides lepers into three classes according to their behaviour under this treatment.

(1) Those who fail to react to even large doses. This class is made up of mild, early and atypical cases.

(2) Those who display or fail to display a febrile reaction according to the dose administered.

(3) Those who react even to the smallest doses (1 or 2 centigrams a day). These cases are usually far advanced and of the tubercular type.

Records of cases are given which show a curious and sustained rise of temperature, persisting as long as the drug is continued and ceasing (C96)

on its being suspended. A daily dose of one gram is what is generally given. Inunctions of Chaulmoogra oil may be combined with it. Some very favourable results have been obtained by this method.

Capsules of iodised Chaulmoogra have been tried but were found to lead to violent reactions, owing to containing too large a proportion (20 per cent.) of iodine.

Turning to the use of injections of iodoform, Leboeuf uses a 10 per cent. suspension in olive oil, the iodoform being added to heated oil and then treated by cooling and by beating up with a glass rod. The result is a milky suspension which passes easily through the needle of a syringe. Individuals vary in their reactions, so that the dose must be suited to the case. An injection of about 1 cc. is often used. Abscesses never result. This treatment should only be used as an adjunct to treatment by Chaulmoogra oil. A 2 per cent. solution of carbolic acid in water also makes a good adjunct to Chaulmoogra oil treatment, 0.5 cc. to 6 cc. being injected twice weekly.

The direct application of carbonic acid snow may also be found useful, generally as an addition to treatment by Chaulmoogra oil, occasionally alone in early and localised cases. Great stress is laid on the importance of rest, good hygienic conditions, and good food, leprosy resembling tuberculosis in its amenability to these conditions in early stages.

S. L. C.

PAUTRIER, DESCAUX & RABREAU. **Du Danger d'Infidélité possible des Injections d'Huile de Chaulmoogra dans le Traitement de la Lèpre.**—*Bull. Soc. Française de Dermatol. et Syph.* 1914. May. Vol. 25. No. 5. pp. 283-285.

This is an important observation on a case of leprosy treated in Paris by intramuscular injections of a mixture of Chaulmoogra oil, oil of eucalyptol and oil of sweet almonds. A series of injections was made into the gluteal muscles over a period extending from November 23rd to February 18th, 24 injections (12 into each side, representing a total volume of 60 cc. of oil) being administered. On March 1st, on attempting to give a further injection, it was noticed that oil exuded along the needle, and on making negative pressure, no less than 50 cc. of oil was recovered, showing that the medicament had become encysted and was not being absorbed at all. This may explain why the case had shown no improvement during the period of treatment. The authors recall the frequency with which salivation has occurred long after a series of intramuscular injections of "Gray Oil" in syphilis, especially where a blow or other impact has occurred capable of rupturing an encysted collection of mercurial oil, and consider that the possibility of such a shutting off of the drug from the circulation must be always borne in mind where oily preparations are used in the form of intramuscular injections.

S. L. C.

NETTER. *Du Rapport de M. Netter, relatif aux Mesures Spéciales de Prophylaxie qu'il conviendrait de prendre dans la France Continentale à l'Égard de la Lèpre.* [Discussion].—*Bull. Acad. Méd. Paris.* 1914. Séance du 28 Avril. 3^e ser. Vol. 71. [78^e année].—No. 17. pp. 611-628.

At the meeting of the Academy of Medicine of April 28th, 1914, the discussion on M. Netter's Report on the Prophylaxis of Leprosy in France [see this *Bulletin*, Vol. 3, p. 491] was resumed. M. GAUCHER stated that he considered the measures suggested by the Committee as better than nothing but, at the same time, insufficient. He proposed amendments to the effect that (1) lepers infected within the territory of continental France should be looked after in their own homes or sent to hospitals, strict quarantine being unnecessary owing to the low infectivity which M. Gaucher sees reason to attribute to cases of local origin; (2) that French subjects, arriving from abroad with leprosy contracted in foreign countries, should be isolated on an island off the coast of France; and (3) that French territory should be absolutely forbidden to all lepers of foreign extraction. In reply, M. Netter pointed out that it would be unscientific to differentiate between cases of the disease contracted in foreign countries and in endemic areas at home, M. Gaucher having himself cited a case of infection arising from a leper of local origin, and brought forward various arguments in favour of the original report of the Committee. After an interesting discussion, the various conclusions of the Committee were put to the meeting and carried unaltered, save for a change in the wording of the first recommendation introduced at the suggestion of M. LAVERAN. The proposals, in their final shape, are as follows:—

(1) Leprosy shall be included amongst the diseases subject to compulsory notification.

(2) Lepers shall be subjected either to special observation or isolation according to the necessities of the individual case.

(3) French territory may be forbidden to lepers of foreign origin.

(4) A special Committee shall investigate each case and decide on the measures to be taken.

(5) In forwarding recommendations on the prophylaxis of leprosy in France, the Academy cannot refrain from earnestly calling the attention of the executive to the need of vigorous measures to limit the spread of the disease in certain of the colonies and protectorates which are much more directly threatened by it than the home territory.

S. L. C.

IRVINE (H. G.) & LARSON (W. P.). *A Case of Leprosy with Attempted Cultures and Animal Inoculations.*—*Interstate Med. J.* 1914. June. Vol. 21. No. 6. pp. 678-681. With 2 figs.

In a case particularly suitable for culture experiments, since it was one of nodular leprosy at a stage before ulceration had commenced and in which the lesions were rich in acid-fast bacilli, the authors made a thorough attempt to grow the bacillus of Hansen, with negative results.

After thorough disinfection of the skin over a nodule by cleaning with alcohol and ether and painting with tincture of iodine, wedge-shaped portions of tissue were excised and used for insemination on Dorset's egg medium and on coagulated horse serum, a small quantity of sterile trypsin solution (Fairchild) being added to each capsule

of the latter. Nutrient agar was also tried. Subcultures showed a progressive diminution of the acid-fast bacilli, so that it was evident that these were merely transferred to the fresh culture tubes, the number diminishing with each transfer. Small pieces of tissue were placed in the anterior chamber in 8 rabbits, and emulsion of tissue was injected into the testicles of 4 more. Two animals showed secondary infection with contaminating bacteria. All the rest of the rabbits remained normal up to nine months, the total period of observation.

S. L. S.

KEDROWSKI (W.). *Zur Histologie der Lepra.*—*Arch. f. Dermatol. u. Syph.* Orig. 1914. May. Vol. 120. No. 1. pp. 267-284. With 1 plate.

In February, 1899, a female patient, born in South Russia (in the District of Don Cossacks), aged 38, married, and the mother of four healthy children and of two that had died in infancy, consulted Dr. A. GUTSCHENKOFF of Moscow, suffering from areas of anaesthesia scattered over the skin surface. Full clinical notes of the case by Dr. G. METSCHERSKY, of the Moscow University Dermatological Clinic, are quoted by the author, and should be studied in the original. It will suffice to say that the patient had first felt ill in 1895, only one spot being visible at that time, and that she had not consulted a doctor until 1898, when the spots suddenly appeared in a variety of places and caused her to become uneasy as to their nature. The spots were of three types—(1) wheel-shaped erythematous plaques, (2) ring-shaped pigmented plaques with a centre free from pigment, and (3) ring-shaped and pigmented plaques with a colourless centre. No nerves could be felt as enlarged. In the neighbourhood of the erythematous pigmented plaques, sensibility to pain was increased, while other sensations were normal. In the colourless central parts of the plaques of the third category, sensation of touch was dulled, the power of localisation was impaired, and the sensation of pain was markedly diminished. Leprosy is fairly common in the Don District where the patient had lived since her marriage. The patient had often heard of it but had never seen a case. Her children and husband were healthy. There was no evidence pointing to tuberculosis in her case. The nasal mucous membrane appeared healthy. For microscopical examination a small piece of skin from a plaque of the third category was removed, including portions of healthy skin, the whole edge and part of the pale central area. The examination of sections showed the following characters:—

The tissues of the true skin were infiltrated with a large number of little nodes, the smaller of which consisted almost entirely of small round mononuclear cells of a lymphoid type, staining blue with haematoxylin eosin. The larger nodes showed similar cells at the periphery but the centre was composed of larger cells with round or oval vesicular nuclei, the cytoplasm staining not blue but pink (epithelioid cells). These sharply demarcated nodes at first sight recalled miliary tubercles, a resemblance heightened by the presence of giant cells scattered here and there in the central areas. Some of these nodes were to be seen in the subcutaneous areolar tissue as well as in the skin, and were commonly associated with hair follicles, sweat-glands, vessels and nerves. Only the papillary layer of the skin was for the most part free from them. In the oldest part of the

lesion—the part of the section corresponding to the centre of the plaque—the infiltration at times reached the Malpighian layer, penetrating as far as the cylindrical-celled area of the latter, so that here the narrow band of skin which usually separates the infiltration from the epidermis in leprosy lesions was completely absent. Up to this point, the characters of the nodes were almost uniform, and only in the more superficial layers of the skin were the cells of a less consistent type, elongated forms appearing and the nodes tending to lose their sharp contours and to shade off into the surrounding tissues. Here, giant-cells indistinguishable from those regarded as characteristic of tubercle, were fairly numerous. On staining by Ziel-Neelson's method, a few acid-fast rods were to be found after prolonged search, lying free or sometimes in epithelioid cells, staining poorly and having a granular appearance. Neither bundles nor aggregations of bacilli were to be seen. The bacilli could not be stained by Baumgarten's method. Inoculation of small portions into guinea pigs led to only negative results.

While the clinical picture was that of a maculo-anaesthetic case of leprosy, the following points were in favour of tubercle:—

- (1) The infiltration of the skin by miliary nodes.
- (2) The presence of giant-cells.
- (3) The small number of isolated bacilli present.
- (4) The absence of a fine continuous layer of cuticular tissue separating the epidermis from the underlying infiltration, a point of decided importance since this layer is usually to be found present in leprosy lesions.

Against the tubercle theory, one histological feature, to which SCHAFER has attached diagnostic importance, was noted: the fact that the epithelioid cells in the centre of the nodes were in many cases vacuolated, the vacuoles filling the whole cell protoplasm and pressing the nucleus to the periphery so that the latter assumed a half-moon shape. Taking all these points into consideration, Dr. METSCHERSKY was obliged to make the provisional diagnosis of "perhaps leprosy" and to let the patient return home. Seven years later (in March, 1906), the patient returned to Moscow and consulted Professor A. POSPELOFF, through whose kindness the author was able to obtain histological material. The clinical condition was now much more advanced, the skin of the trunk and extremities being covered with an enormous number of plaques of various shapes, sizes and colour, many being raised above the surrounding surface. The type of plaque showing a central depression was no longer to be seen. The nasal mucous membrane still appeared normal. On microscopical examination of a portion of skin from a raised plaque, the appearances were quite different from formerly. The tuberculoïd nodes were absent. Giant cells could not be found. Instead of a granuloma with the vascularity and other characters of a new growth, there was now to be seen a collection of cells of varying size and shape between which were visible both fine and coarse processes of connective tissue. Vacuolated cells were present. The whole infiltrated area had taken on a definitely sclerotic character. Ziel-Neelsen's staining now showed the presence of numerous acid-fast bacilli, some free, others in the interior of cells and frequently gathered together into little heaps. On the whole, the picture had now taken on a character typical of leprosy.

It is therefore clear that the patient was, as her clinical condition indicated, a leper on the occasion of her earlier visit to the Moscow

Clinic, although the histological characters at that time were on the whole indicative of tubercular infection rather than of leprosy. The author rightly regards the case as one of great interest and importance as illustrating the fact that Hansen's bacillus can give rise to lesions similar to those produced by the tubercle bacillus. As he says, "It is high time that we reconsidered our old views on the histology of leprosy and formed a truer estimate of the observed facts."

The paper closes with a summary of the previously recorded cases of tuberculoid lesions produced by lepra bacilli and with an interesting discussion of the question (raised by LIE) whether such appearances could be due to a symbiosis of leprosy and tubercle bacilli in the same lesion. The author advances arguments in favour of his opinion that this explanation is inadequate and that it is, on the whole, much more probable that Hansen's bacillus, resembling the bacillus of Koch in so many ways, can, under certain circumstances, give rise to lesions histologically similar to those produced by the latter. S. L. C.

PHILIBERT (André). *Lèpre humaine et Lèpre murine. [Le mouvement médical.]—Progrès Médical.* 1914. May 2. Vol. 42. No. 18. pp. 210-212.

Philibert calls attention to the very close analogy between human and rat leprosy, quoting from the work of MARCHOUX [see this *Bulletin*, Vol. 3, p. 505] at some length in support of his opinion. The similarity in the geographical distribution of the two diseases in Europe, their many clinical features in common, the histo-pathological and bacteriological affinities, as well as certain comparable epidemiological characters, all point to the closest relationship, if not to the identity, of Hansen's bacillus with the bacillus of Stefansky. After a review of the attempts to cultivate the bacillus of leprosy [in which no mention is made of the work of KEDROWSKY or BAYON], Philibert concludes that the organism has not yet been cultivated, thus presenting still another feature in common with rat leprosy. He mentions the facility with which the latter can be transmitted from rat to rat and calls attention to the recent claim of NICOLLE and MARCHOUX to have caused benign and transitory leprosy lesions in monkeys by the inoculation of human leprosy material. He recalls the fact that SUGAI obtained what he believed to be an infection of 18 out of 24 Japanese dancing mice with human leprosy bacilli, and he attaches much importance to this susceptibility of a rodent known to be subject to a disease comparable to leprosy. It is suggested that the mouse is likely to prove suitable for inoculation with leprosy of human origin since it can be infected artificially with the bacillus of Stefansky and yet does not suffer naturally from the latter organism, being thus free from the sources of fallacy to which the sewer rat is liable. Even if it should be ultimately proved that human and rat leprosy are identical, Philibert believes that there could be no possible danger to humans from rats, as the rat strain must have by now adapted itself for survival in the tissues of the rodent and lost its power of infecting human beings. [The paper is interesting and suggestive. For many reasons, recent attempts to solve the question of human leprosy by direct method have been disappointing, and this fact gives all the more importance to the study of allied diseases in animals.]

S. L. C.

HELMINTHIASIS.

JUDKINS (O. H.). Some Observations on Intestinal Parasites in Texas, based upon Microscopic Findings in Fifteen Thousand Cases.—*Texas State Jl. of Med.* 1914. July. Vol. 10. No. 3. pp. 126–128.

Fifteen thousand cases were examined in the section of Texas between the Colorado and Sabine Rivers and as far north as Smith County, in connection with the work of the Rockefeller Sanitary Commission. The protozoal and other findings save of helminths are ignored in the present abstract. The helminthic results are tabulated:—

No. of cases, 15,000.

<i>Necator americanus</i>	3,844
<i>Hymenolepis nana</i>	71
<i>Taenia saginata</i>	67
<i>Taenia cucumerina</i> [<i>Dipylidium caninum</i>] ..	2
<i>Oxyuris vermicularis</i>	561
<i>Ascaris lumbricoides</i>	42
<i>Strongyloides stercoralis</i>	4
<i>Tricocephalus dispar</i>	28

The *Taenia saginata* occurred mostly amongst people of German or Bohemian descent. *Hymenolepis nana* is the commonest tapeworm observed in Texas; the 71 cases are fairly well distributed over the country. Although only 42 cases appear in the table, it is stated in the text that the *Ascaris lumbricoides* is a very common parasite in Texas.

The total number of faecal examinations of all ages, sexes, colours and occupations made in thirty [tabulated] Texas counties up to April 1st, 1914, was 52,745. Of these 15,222 were infected with *Necator americanus*. The total number of children, from age 6 to 18 years, examined was 24,782, showing 39 per cent. infected with *Necator americanus*.

R. T. Leiper.

WILLETS (David G.). Intestinal Helminthiasis in the Philippine Islands as Indicated by Examinations of Prisoners upon Admission to Bilibid Prison, Manila, P. I.—*Philippine Jl. of Science*. Sect. B. Trop. Med. 1914. June. Vol. 9. No. 3. pp. 233–240.

This paper gives the results of the examination of 7,843 adult males admitted to Bilibid Prison from all parts of the Philippines, and should be read in conjunction with those published by GARRISON in 1911. It is notable that the percentage of cases of hookworm in Willets's tables is 22.2 per cent., while that obtained by GARRISON was 52 per cent.

R. T. E.

CHINA MEDICAL JOURNAL.—1914. July Vol. 28. No. 4. pp. 277–280.
 Extracts from Report of E. de M. Stryker, M.D., for 1913. Suan
 Mine Hospital, Korea.

Results of microscopical examinations are tabulated:—

Parasite.	95 In patients.		111 Out patients.	
	Cases.	Per cent.	Cases.	Per cent.
<i>Ascaris lumbricoides</i> ..	82	86.1	93	84
<i>Tricocephalus trichuris</i> ..	75	79	77	69
<i>Ankylostoma duodenale</i> ..	52	54.7	68	61
<i>Oxyuris vermicularis</i> ..	2	—	—	—
<i>Strongyloides intestinalis</i> ..	2	—	—	—
<i>Ascaris canis</i> (?) ..	1	—	—	—
<i>Paragonimus westermanni</i>	9	—	—	—
<i>Opisthorchis</i> [<i>Clonorchis</i>]				
<i>sinensis</i>	2	—	—	—
<i>Cotylagonimus heterophyes</i> (?)	2	—	1	—
<i>Taenia saginata</i>	11	—	5	—

The ova of *Paragonimus* were found in the faeces of nine cases.

R. T. L.

CADBURY (W. W.). Results of Examinations of Faeces made at the
 Hospital of the University Medical School, Canton, 1913. [Research
 Reports].—*China Med. Jl.* 1914. July. Vol. 28. No. 4.
 pp. 271–274.

In view of the great prevalence of ankylostomiasis amongst the
 Chinese in the province of Kwangtung in South China, an examination
 of the faeces of students of the better class was undertaken in view
 especially of the stringent regulations governing the admission of
 Chinese into the United States.

In 76 students from Canton between the age of 11 and 25, 49 (i.e.
 64 per cent.) gave a positive finding of ova of intestinal worms, viz.:—

<i>Ascaris</i>	36 cases.
<i>Tricocephalus</i>	18 cases.
<i>Clonorchis</i>	7 cases.
<i>Ascaris</i> and <i>Tricocephalus</i>	12 cases.
<i>Clonorchis</i> and <i>Tricocephalus</i>	1 case.

No case of *Ankylostome* was found, although some who were sus-
 pected of being infected were examined more than once.

R. T. L.

CHASTANG. Comptes Rendus de Parasitologie: 1. *Schistosomum japo-
 nicum* et Fièvre du Yang-tse. 2. Sur l'Étiologie de la Distomatose
 Hépatique.—*Arch. de Méd. et Pharm. Navales.* 1914. May.
 Vol. 101. No. 5. pp. 321–325.

1. Brief summary of preceding writings by LAMBERT, DANTEC,
 EDGAR and HUTCHESON on the connection between Yangtse fever
 and *Schistosoma* infection [see this *Bulletin*, Vol. 4, p. 99.]

2. Summarises briefly HOUGHTON's paper in the *China Medical
 Journal*, May, 1913, in which the conclusion is reached that a small
 fish of the genus *Notropis* is the intermediate host of *Clonorchis
 sinensis*.

R. T. L.

- BOVAIRD (David) & CECIL (Russell L.). *Schistosomiasis japonica: A Clinical and Pathological Study of Two Cases.*—*Amer. Jl. Med. Sci.* 1914. Aug. Vol. 148. No. 2. [No. 509]. pp. 187–206. With 3 figs.

This paper consists essentially of careful clinical and pathological notes of two cases of *Schistosoma* infection contracted in Japan, which came under the author's observation in New York. There are further paragraphs apparently compiled from other sources dealing with the History of the Disease and the Geographical Distribution, Morphology and Pathogenesis, Symptomatology, Diagnosis, Prognosis and Treatment, the whole forming a useful and accurate resumé of our knowledge of this disease at the present time.

R. T. L.

- THOMPSON (G. S.). *Ionisation for Bilharziasis.* [Correspondence.]—*Lancet.* 1914. Oct. 17. pp. 966–967. *Ionization for Bilharziosis.* [Memoranda.]—*Brit. Med. Jl.* 1914. Oct. 31. p. 756.

It is suggested that in view of the penetrative effects of ionization in ringworm, similar treatment in bladder infection with *Bilharzia* might ameliorate the condition by destroying the living worms in the tissues. [This idea for the treatment of *Bilharzia* should have been given a trial before publication.]

R. T. L.

- YOSHIDA (S. O.). *On a Second and Third Case of Infection with Plerocercoides prolifer Ijima found in Japan.*—*Parasitology*.^{*} 1914. Oct. Vol. 7. No. 3. pp. 219–225. With 1 plate.

At the autopsy of a monk aged 36 who, after an illness lasting six years, died in the Imperial University Hospital of Tokio, an enormous number of cestode larvae were found in the subcutaneous fat, muscles, wall of the alimentary canal, mesentery, kidney, lung and heart. A few were found also in the ventricle of the brain. No worms occurred in the spinal cord, the orbit or the cavities of the heart. So abundant were the worms in the tissues that no portion could be cut without damaging the parasites. Most were encapsuled, but some were free in the tissues. The capsules were usually ovoid in shape, measuring 3 to 6 mm. in length and breadth, but attaining a measurement even of 16×5 mm. The specimens removed from the capsules showed slow movement and extension in warm saline solution; the largest measured 75×2 mm. Buds may form on any part of the body and on small as well as large individuals. The sucker-like groove at the anterior end is only a temporary invagination. In structure the parasites tally with the description given by IJIMA. Before death the patient was weak and anaemic. The presence of the worms under the skin was indicated by vermicular or knoblike swellings, more

^{*}Readers should not confuse "*Parasitology*" the well known journal published by the Cambridge Press with the "*Journal of Parasitology*" (edited by Professor Henry B. Ward and newly published in America). It is regrettable that the title of the new Journal does not indicate its American origin. R.T.L.

frequent upon the breast and abdomen than on the face, trunk and extremities. The number of swellings appeared to vary periodically.

In the second case noted by the author the parasites were all small with few branches or buds. The swellings caused by the worms had been observed by the patient for thirteen years. In a large swelling of the thigh, from which pus was evacuated, a number of cestode larvae were present. This patient is still alive.

R. T. L.

HALL (Maurice C.). **Experimental Ingestion by Man of Cysticerci of Carnivore Tapeworms.**—*Jl. of Parasitology** [U.S.A.]. 1914. Vol. 1. No. 1. pp. 42-44.

Three cases of *Taenia serrata* (*T. pisiformis*) in man were recorded by VITAL in 1874, but have been consistently regarded by parasitologists as doubtful or erroneous. The author has on two occasions eaten the larvae of this dog tapeworm. In 1896 MONIEZ had fed *Cysticercus pisiformis* to two volunteers, and in 1898 GALLI-VALERIO had reported that he had once ingested six of these larvae. In no case did experimental infection result.

The author quotes the experimental work, already recorded in literature, with *Multiceps serialis* [*Coenurus serialis*], *Taenia teniaeformis* [*Cysticercus fasciolaris*], *Taenia ovis* [*Cysticercus ovis*] and *Taenia hydatigena* in support of the conclusion that adult cestodes of the genus *Taenia* occurring in carnivores do not occur in man. The converse is also true.

R. T. L.

RANSOM (B. H.). **The Destruction of the Vitality of *Cysticercus bovis* by Freezing.**—*Jl. of Parasitology* [U.S.A.]. 1914. Vol. 1. No. 1. pp. 5-9.

The researches of PERRONCITO, ZSCHOCKE, OSTERTAG and others have definitely proved that a lapse of twenty-one, but not of fourteen, days after slaughter of cattle is sufficient to destroy the beef *Cysticercus*, and the meat inspection regulations of the United States and other countries accordingly allow carcasses showing a slight degree of infestation to be passed for food after retention in cold storage for twenty-one days. The least objectionable and most practicable means of shortening this period would be exposure to low temperatures. Ransom has undertaken a series of fresh investigations to ascertain the minimum length of exposure and degree of frost necessary completely to destroy the vitality of cysticerci. Two beef carcasses heavily infested with live cysticerci were allowed to hang for about 24 hours after slaughter in a chill room, the temperature of which was somewhat higher than the freezing point, then quartered and placed in a cold storage compartment in which the temperature varied between 11° and 15° F. but mostly from 14° to 15° F. One quarter carcass was kept as a control in the chill room. More than two days of exposure in the freezer was necessary to ensure that the beef was solidly frozen throughout. Portions removed after a lapse of three, four, five and six days were dissected after being allowed to thaw for 18 to 24 hours.

* See footnote page 519.

Of the *Cysticerci* there were found to be alive after three days 44 per cent. ; after four days 40 per cent. ; after five days 5 per cent. ; while after six days' exposure none showed any evidence of being alive either by microscopical examination or by infecting the writer, by whom they were swallowed. The *Cysticerci* from the quarter kept unfrozen as a control were all active after eight days.

On the basis of these experiments the United States Federal Meat-Inspection Regulations have been amended to permit beef carcasses showing a certain slight degree of infestation to be passed for food if held for six days at a temperature not exceeding 15° F. (—9.44 C.), as an alternative to the requirement of retention for twenty-one days in coolers. As over 40,000 beef carcasses are annually retained in the U.S.A. on account of *Cysticercus bovis*, these investigations should result in considerable saving.

R. T. L.

Archivos Brasileiros de Medicina.—1914. Jan.-Feb. Vol. 4. Nos. 1-2. 191 pp. With 8 plates. Rio de Janeiro: Redacção: R. Gonçalves Dias. 26.

This volume is a symposium on ankylostomiasis.* It consists of 14 papers and a Brazilian bibliography of the disease, containing 100 references. The papers, with one exception, are in Portuguese, but the conclusions are in many cases printed also in French or German.

Drs. GOMES FARIA and LAURO TRAVASSOS (pp. 3-26) deal with the morphology, classification, and biology of ankylostomes. Their article is illustrated by 8 plates.

Dr. A. AUSTREGESILLO deals with infection through the skin. He has confirmed on the persons of two students the observations of Looss and others. One showed infection after 67 days, the other later.

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- *I. GOMES FARIA & LAURO TRAVASSOS. *Morphologia Systematica e a Biologia dos Ancylostomos.* pp. 3-26.
 - II. AUSTREGESILLO (A.). *Infestation de l'Ankylostomiasse par la Peau.* pp. 27-33.
 - III. DUQUE (Henrique). *O Fígado na Ancylostomose.* pp. 34-38.
 - IV. AYRES (Octavio). *O Coração na Uncinariase.* pp. 39-43.
 - V. ESPOSEL (F.). *Perturbações Mentaes na Uncinariase.* pp. 44-52.
 - VI. AYRES (Octavio). *Perturbações Nervosas na Uncinariase.* pp. 53-66.
 - VII. MOREIRA da FONSECA (Joaquim). *Hematologia na Ankylostomiasse.* pp. 67-110.
 - VIII. GASTÃO LUIZ CRULS. *Viscosidade do Sangue e sôpros Anemicos (Pesquisas na Ankylostomiasse).* pp. 111-120.
 - IX. RIEDEL (G.). *Do Attrito Interno na Urina dos Uncinariosos e sua Relação com o peso da Molecula Elaborada.* pp. 121-124.
 - X. FRANÇA (Mauricio). *Corprologia da Uncinariase.* pp. 125-132.
 - XI. de BARROS (Jacyntho). *Epidemiologia no Brasil.* pp. 133-138.
 - XII. VIEIRA ROMEIRO (E.). *O Tratamento da Ankylostomiasse.* pp. 139-146.
 - XIII. de ALMEIDA (Waldemar). *Alguns Vegetaes da Flôra Brasileira empregados no Tratamento da Uncinariase.* pp. 147-149.
 - XIV. *Theses Recentes a Proposito da Uncinariase.* 1908-1914. pp. 150-152.
 - XV. D'UTRA E. SILVA (Oscar). *Sobre o Valor Therapeutico de alguns Anthelminticos.* pp. 153-185.
 - XVI. *Bibliographia Brasileira da Ankylostomiasse.* pp. 185-191.

Dr. Henrique DUQUE deals with the liver in ankylostomiasis. He finds that there is as a rule some enlargement, the result of congestion owing to increased function.

Dr. Octavio AYRES deals with the heart. The condition varies from one in which there is merely acceleration of pulsation to degeneration of the parenchyma.

Dr. F. ESPOSEL (pp. 53-66) treats of mental disturbances, Dr. Octavio AYRES of nervous disturbances. These include abolition or diminution of knee jerks, increase of sensibility to pain, numbness, neuralgia, pain in head and tibia, amaurosis and hemeralopia, anisocoria and singing in the ears.

Dr. Joaquim MOREIRA da FONSECA (pp. 67-106) has a long article on blood changes. He gives a bibliography. His conclusions occupy 57 paragraphs.

Dr. Gastao LUIZ CRULS writes, with tables and a bibliography, on the viscosity of the blood.

Dr. G. RIEDEL writes on the internal friction of the urine and its relation to the molecular weight, Dr. Mauricio FRANÇA on the faeces.

Dr. Jacyntho de BARROS writes on the epidemiology of the disease in Brazil, Dr. J. Vieira ROMEIRO on treatment; he prescribes either thymol, B naphthol, or herba S. Maria (*Chenopodium brasiliense*). It is given every week till the eggs disappear.

Dr. Waldemar de ALMEIDA writes on some plants of the Brazilian flora employed in treatment.

A list follows of recent theses published at Rio, with summaries of their contents.

Dr. Oscar D'UTRA e SILVA (pp. 153-182) writes concerning the therapeutic value of certain anthelmintics.

A. G. B.

REED (Alfred C.). **Prevalence of Hookworm at Changsha.**—*China Med. J.* 1914. July. Vol. 28. No. 4. pp. 263-266.

A preliminary study of the prevalence of ankylostomes in the population of Changsha, a city of 300,000 inhabitants in Central China, shows that the percentage of helminthic infections in 120 unselected cases drawn indiscriminately from among servants, students, coolies, and other available persons in normal health, together with all hospital admissions during a limited period, was as follows:—

Hookworm	..	..	..	11.6 per cent.
Ascaris	..	..	..	60.8 " "
Tricocephalus	..	..	..	9.1 " "
<i>Schistosoma japonicum</i>	..	..	..	1 case.

Less occupational exposure, to which footbinding contributes, explains a rate of incidence of 3 per cent. amongst women as contrasted with 15 per cent. in man. The positive cases were scattered through many occupations, though farmers and boatmen were especially liable.

R. T. L.

REED (A. C.). **Prevalence of Hookworm at Pinghsiang Colliery.—An Abstract.**—*China Med. Jl.* 1914. July. Vol. 28. No. 4. pp. 267-268.

The Pinghsiang Colliery in South Central China is the largest in China, and has very extensive underground workings. It employs about 9,000 men, of whom about 6,000 work underground. An examination of 272 persons showed a general incidence of 81.6 per cent. Of the 225 who worked underground 90.2 per cent. were found infected. The ratio of incidence was much less in the above-ground works. It is thought that the actual percentage obtained is a minimal figure, and that it really approaches 100 per cent. The only factors determining the rate of incidence are conditions in the mine itself—viz., the excessive moisture, high temperature, darkness, promiscuous defaecation, lack of sanitary control, and the habits and clothing of the coolies.

R. T. L.

TURBERVILLE (J. S.). **Hookworm Disease and Pregnancy.—The Dangers.**—*Southern Med. Jl.* 1914. Nov. Vol. 7. No. 11. pp. 862-864.

The author's observation has taught him not to fear abortion in hookworm patients. Previous writers must have had in mind the very worst cases, which are not common. Eclampsia is, however, a danger to which these patients are more exposed in consequence of their pregnancy. In a number of cases all the evidence of a grave toxæmia of pregnancy was relieved quickly and permanently by the eradication of hookworms. In hookworm disease the oedemas of pregnancy are apparently more frequent. The offspring as well as the hookworms exercise a parasitic function on the mother. The mother who is very anaemic from hookworm may bear a splendid-looking offspring.

R. T. L.

JERVEY (J. W.). **The Influence of Hookworm Disease on the Eyes. A Study of Fifty-Three Cases.**—*Jl. Amer. Med. Assoc.* 1914. July 11. Vol. 63. No. 2. pp. 151-155.

A study of the eye symptoms in 53 hookworm patients leads the author to conclude that hookworm disease, by virtue of the qualitative and quantitative anaemia and the general systemic ill condition for which it is responsible, is, in this indirect way and in this way only, a causal factor in the various eye lesions described as accompanying it. None of the eye lesions is in any sense sufficiently distinctive or characteristic to be of diagnostic value. In the light of present knowledge the occurrence of eye symptoms in ankylostomiasis is to be regarded as purely incidental or as a sequel of general pathological conditions, but the signs of anaemia in the fundus may lead us to suspect hookworm infection as possible.

R. T. L.

VAN METER (B. F). **Hookworm Arthritis. (Report of Case).**—*Kentucky Med. Jl.* 1914. July. Vol. 12. No. 13. pp. 429–430.

A report of a case of a boy, age 7, diagnosed as tubercular arthritis of both ankles. The boy was very thin and emaciated; both ankles were swollen and tender with limitation of movement in all directions. No oedema of the legs. Ova of ankylostomes were found in the faeces, and after treatment the patient put on 20 pounds in weight and was entirely freed from pain. The author regards this as a clear-cut case of hookworm arthritis.

R. T. L.

DINSMORE (Wm. W.) & MOSS (P. B.). **Report of an Interesting Case of Diabetes Mellitus showing Hookworm Infection.** *Southern Med. Jl.* 1914. June. Vol. 7. No. 6. pp. 485–487. With 3 figs.

This is a detailed history of a case of diabetes mellitus in a patient 16 years of age. The hookworm infection was of secondary importance, and no improvement took place in the condition after specific treatment for ankylostomes.

R. T. L.

DAY (H. B.). & FERGUSON (A. R.).—**The Treatment of Ankylostoma Anaemia.**—*Lancet.* 1914. July 11. pp. 82–87. With 8 charts.

In over 300 cases of Ankylostomiasis a regular blood examination has been made to test the efficacy of the treatment adopted. The paper gives, in a very illuminating way, the conclusions derived therefrom. A mixture of 3 to 4 grams of thymol with 3 grams of Beta naphthol was generally used. The addition of the Beta naphthol reduces the necessary dose of thymol and ensures a thorough breaking up of the crystals, which often tend to pack together in the cachets. Oleum chenopodii has been discarded because it is expensive and has a peculiarly disagreeable flavour most repulsive to patients.

In response to anthelmintic treatment a rise in the number of red corpuscles precedes the rise of haemoglobin. In severe chronic cases satisfactory improvement may not occur or may be delayed for some months. Hematinic treatment is usually essential; thus even in patients with severe anaemia there is a rapid amelioration, may be before all the worms are expelled. In the first week there is generally a rise of 20 to 30 per cent. in the haemoglobin value, slowly increasing later. In severe cases, although all the worms are expelled and arsenic given, there may be no rise of haemoglobin until iron is substituted, when the response is immediate. When iron is given from the first, any rise in haemoglobin value is a most useful guide to the expulsion of the worms, and a halt generally indicates that a further anthelmintic course is necessary. Reduced iron, ferric perchloride and ferrous sulphate yield an average haemoglobin increase of from 9 per cent. to 13 per cent. weekly. Blaud pills and the ammonio-citrate are slightly inferior. Organic preparations have no advantage, and preparations of haemoglobin are generally useless. Manganese cannot be substituted for iron. In severe cases the administration of arsenic is often essential to recovery and, where in such cases arsenic by the

mouth is ineffectual, hypodermic medication generally succeeds. By itself, however, arsenic is useless; iron is always essential to recovery in severe cases.

Persistent eosinophilia after complete expulsion of worms may be due to the presence of living larvae in the tissues. A high eosinophilia in the early weeks may fall when the responsive powers of the marrow are impaired by chronic anaemia. So long as there is fever rising over 100° F. from any cause haematinics are powerless to affect the anaemia. This fever may be due to malaria or to secondary infections at the sites of the bites in the intestines. Intense and persistent anaemia in ankylostomiasis generally denotes exhaustion and atrophy of the bone marrow.

R. T. L.

FERGUSON (J. E. A.) Report on the Peter's Hall District. British Guiana.—Combined Court. Annual Session. 1914. 12 pp. Georgetown, Demerara: The Argosy Co., Ltd.

From experience extending over a number of years the author introduces a method of treating ankylostome infection in people on estates without impeding or disorganising the routine work. This method, which proved practicable and efficient, consists in the administration of a cachet of 10 grains of thymol *each night* for a period of many weeks. This moderate dose did not interfere in the least with the ordinary occupations. Repeated microscopical examinations showed a gradual diminution of the number of ova in the dejecta until at the end of four months these had entirely disappeared. On an average about a hundred pulverettes administered in this way were required to each person, but it was noted that the "pulverette" not infrequently appeared partially undissolved in the stools. All persons who harbour the parasite, who are not extremely anaemic and weak and who are otherwise free from disease, can undergo this course of treatment with perfect safety whilst following their usual occupation. It is also eminently suited to pregnant women and old people. The provision of latrines and the proper disposal of night soil is of course also necessary. [The author unfortunately fails to give the annual cost of the treatment.]

R. T. L.

CHRISTIE (W. F.). Notes on the Migration of *Ascaris lumbricoides*.—*Jl. R. Army Med. Corps*. 1914. Aug. Vol. 23. No. 2. pp. 201–205. With 2 figs.

In 800 post mortem records of the Straits Medical Service, Singapore, in which *Ascaris lumbricoides* were found in the intestines, only ten cases showed migration to other organs, namely, one to the lung, one to the peritoneal cavity, one to the stomach and seven to the liver. Clinical and pathological notes of five of the cases are given. Cases seldom show more than half a dozen round worms at a time. [This can scarcely apply to other countries, e.g. China.]

R. T. L.

LÊ-VAN-CHINGH. *Tétanos Ombilical et Lombricose*. [Paragraph: Lombricose]. *Extrait du Rapport Médical Annuel de 1912 de la Province de Hung-Yen*. [Clinique d'Outre Mer].—*Ann. d'Hyg. et Méd. Colon.* 1914. Apr.-May-June. Vol. 17. No. 2. p. 602.

A case treated by santonin passed 531 *Ascaris*. In another case all the symptoms of acute appendicitis disappeared after the expulsion of 30 *Ascaris*.

R. T. L.

NAIR (T. K. Gobindan). *Ascaris lumbricoides* Infection in Malabar District.—*Indian Med. Gaz.* 1914. Sept. Vol. 49. No. 9. pp. 349-352.

The author draws an alarming picture of the ravages caused by the *Ascaris lumbricoides*, especially in children, in the Malabar District of the Madras Presidency. "When once these parasites gain entrance into their body, they play such havoc of destruction on their hosts that only personal experience can convince." "There is a very high death-rate from round worm in Malabar and the causes of infantile mortality as shown in the village vital statistics are invariably a gross misrepresentation often due to want of expert examination." In one sad case "a devil's play was suspected by the folk, and my necromancy with the magical santonine drove out the devil the next day. People would not believe that I was no enchanter with satanic credentials." "A child of 18 months once passed 90 mature worms before me, and having thus delivered her enormous conception to the broad daylight of the earth the poor thing very silently merged into the tranquil sphere of eternity," etc. [Surely this article cannot have passed the distinguished Editorial Board of the Indian Medical Gazette.]

R. T. L.

FOSTER (W. D.). *Observations on the Eggs of Ascaris lumbricoides*.—*Jl. of Parasitology*. [U.S.A.] 1914. Vol. No. 1. pp. 31-00

The eggs of *Ascaris lumbricoides* are sometimes atypical. In 1902 MIURA and NISHIUCHI drew attention to the not uncommon unfertilised egg. Last year FOSTER in a brief note reported another form in which the egg departed from the normal only in having an exceptionally long major axis. In the present paper the author gives the results of an examination of over 200 eggs derived from man and swine. No sharp demarcation occurs between the excessively long egg and the average egg, for specimens can be found to make a complete series. It is noteworthy, however, that the diameter remains fairly constant, as the length of the egg increases, while eggs from different worms varying greatly in size have also approximately the same diameter. No place could be found in the genital tract where the eggs when in a plastic condition would be subjected to pressure tending to give them this uniform diameter.

R. T. L.

INNES (J. Alexander) & CAMPBELL (A. Elmslie). **The Occurrence of *Oxyuris vermicularis* in the Human Vermiform Appendix.**—*Parasitology*. 1914. June. Vol. 7. No. 2. pp. 189-200.

From a study of 100 unselected cases of appendicitis in which the appendix was removed by operation in Aberdeen, Scotland, the authors arrived at the following conclusions:—

1. The percentage of appendices from cases of appendicitis infected with *Oxyuris vermicularis* is a fairly high one. In Aberdeen it is 17 per cent.

2. Normal appendices show a much lower percentage of infection.

3. The appendices of children probably show a higher percentage of infection than those of adults.

4. The recurrent type of appendicitis is most frequently associated with *Oxyuris* infection.

5. There is probably a clinical type of *Oxyuris* appendicitis.

6. The suppurative type of appendicitis has practically no relationship to *Oxyuris* infection.

7. *Tricocephalus trichiurus* is not commonly found in the appendix.

The series of cases was mainly composed of adults whose ages ranged from 15 to 53 years, and the commonest age of infection with *Oxyuris* in the appendix seems to be between the 21st and 24th years.

R. T. L.

FRACKER (S. B.). **Variation in *Oxyurias*: its Bearing on the Value of a Nematode Formula.**—*Jl. of Parasitology*. [U.S.A.] 1914. Vol. 1. No. 1. pp. 22-30.

In 1890 N. A. COBB established a "nematode formula" for the diagnosis of species and has consistently used it for over one hundred species of free living round worms. The author set out to test its usefulness in the differentiation of species of parasitic nematodes, using about 100 specimens of *Oxyuris vermicularis* obtained from one patient and voided at the same time. He concludes that the use of the formula is likely to yield more confusion than assistance and to result in the multiplication of so-called species without a proper basis for their separation. A species should not be described as new on account of a deviation from the proportions of known species unless that deviation is great and fundamental. The space occupied by the reproductive organs should not be considered and little dependence should be placed on the width of the body. The proportionate size of the organs in Nematoda is, however, an important factor in their identification and should be stated in any description of a new species.

R. T. L.

MANOILOFF (E.). **Untersuchungen mit dem Abderhaldenschen Dialysierverfahren bei Helminthiasis.** [Investigations with Abderhalden's Dialysis Process in Helminthiasis.]—*Wien. Klin. Wochenschr.* 1914. Mar. 12. Vol. 27. No. 11. pp. 269-271.

The author refers to the observations of RUBINSTEIN and JULIEN, who thus tested the serum of 20 horses infected with *Ascaris megalocephala*. The serum of 18 gave a positive reaction. This shows that the serum of horses infected with ascarides contains ferments which

in vitro are able to split up the albuminoid substances of the fluid portions of the parasites, and also that the infected animals absorb substances from the parasites and produce specific antibodies. The author gives details of his technique. He examined 18 persons infected with *Taenia solium* and four with *Ascaris lumbricoides* by the dialysis process. The results are shown in two tables. In the 18 cases of *T. solium* the result was positive in each instance and the controls were all negative. Microscopic examination of the faeces for eggs failed to show them in seven instances. In every case tapeworms were expelled by treatment. In the four cases of *Ascaris lumbricoides* the result was positive in each instance and the controls were negative. It follows, the author writes, that by the use of Abderhalden's dialysis process, in the case of *T. solium* and *A. lumbricoides* very useful results can be obtained, which can be used for clinical purposes.

[Readers desirous of obtaining further information upon the dialysis process should consult ABDERHALDEN'S "Defensive Ferments of the Animal Organism"—Bale, Sons & Danielsson.]

A. G. B.

HALL (Maurice C.). Unusual Case of Fatal Poisoning from the Administration of Male-Fern as a Vermifuge.—*Jl. Amer. Med. Assoc.* 1914. July 18. Vol. 63. No. 3. pp. 242-243.

The danger of the oleoresin of male-fern in unqualified hands is well illustrated in this short paper. A young man, aged 23, was prescribed a remedy for "worms" by a quack doctor. Two or three eight-ounce bottles were taken and caused considerable nausea and diarrhoea. Thereafter he took, as directed, one or two ounces of castor oil and twenty drops of turpentine. Alarming symptoms followed, terminating in death. At the necropsy on the day following death, the rigidity and cyanosis had disappeared. Both lungs were oedematous, the liver enlarged, the spleen somewhat congested. Both kidneys were congested. The upper portion of the intestine for about three feet from the pylorus was haemorrhagic and intensely inflamed. There were other inflammatory areas lower in the intestine. The amount of male fern taken could not be exactly ascertained, but evidently it was in excess of the usual dose, while the addition of castor oil would increase the absorption and toxicity of the drug.

R. T. L.

MISCELLANEOUS.

HOWSON (Frank), HOLMES (Martyn J.) & MAPLESTONE (Philip A.). **The Working Power of the White Man in the Tropics.** (Correspondence.)—*Brit. Med. Jl.* 1914. Oct. 17. pp. 692-693.

The authors writing from Darwin state that, as regards the working power of the white people in the Northern Territory of Australia, those who spend their whole existence in the open or exposed to the full force of climatic conditions are capable of as good a day's work as are the men working in more temperate climates and that they retain their strength and vigour unimpaired after many years of residence in the territory. Such people take no precautions to protect themselves against the actinic rays of the sun, their working costume often consisting of boots, breeches and a felt hat only. On the other hand people who become accustomed to umbrellas and screen themselves from the sunlight are less healthy and less capable of severe exertion.

According to the authors there is a comparative absence in Northern Australia of the diseases usually prevalent in other tropical countries, and they consider that the great bar to the settlement and development of the tropics by the white race is the presence of these diseases and not climatic unsuitability.

G. C. Low.

TAYLOR (F. H.) & YOUNG (W. J.). **The Coastal Climate of Tropical Queensland. Meteorological Observations taken at Townsville.**—*Jl. Trop. Med. & Hyg.* 1914. Aug. 1. Vol. 17. No. 15. pp. 225-227. With 2 figs.

A daily series of observations of the local meteorological conditions prevailing at the Australian Institute of Tropical Medicine, Townsville, North Queensland, was taken from April, 1913. The present paper deals with these, the records having been summarised in a series of tables.

A comparison of the intensity of the sunlight, as regards those rays in the violet and ultra-violet portions of the solar spectrum, is given for Townsville and other tropical places, this having been calculated by the oxalic acid decomposition method as recommended by the late Dr. FREYER of the Bureau of Science, Manila.

The figures given by the authors demonstrate that there is no difference between the hot and cool seasons as regards the maximum intensity of sunlight and that the lower averages which are obtained during the hot wet season are due to the fact that during this time there are a number of days when the sun is obscured by clouds. The high yearly average is accounted for by the long dry season with its continuous sunny weather.

G. C. L.

CHAMBERLAIN (Weston P.). **The Influence of Tropical Residence on the Blood.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914. July. Vol. 2. No. 1. pp. 41-54.

The subject is discussed under three headings—erythrocytes and haemoglobin, leucocytes, and significance of the findings. A series

of blood estimations is given and these are compared with similar observations made upon male Bengalese in India by McCAY. This observer found an average of 5,300,000 red cells per cubic millimeter with 81 per cent. of haemoglobin (HALDANE'S method). Chamberlain's average erythrocyte counts at different periods ranged from 5,111,000 to 5,355,000 per cmm. with an average haemoglobin percentage of 88 to 90. Granting therefore that the blood of young healthy white men of 20 months residence in the Philippines contains about 5,300,000 red cells per cmm. and 88 to 90 per cent. of haemoglobin, the author asks whether this condition differs from that prevailing in temperate zones. From a comparison of counts made in the latter regions he believes it does not.

As regards the number of leucocytes the author's observations showed nothing unusual for either whites or natives. The mean count of 62 healthy Americans with an average service of 14.6 months in the Tropics was 7,304 white cells per cmm. and for another group, consisting of 175 Americans with an average tropical service of 20 months, 7,062.

Commenting upon the significance of the blood findings in the Philippines the author comes to the conclusion that tropical anaemia, due to the effect of climate *per se*, does not exist. More recent investigations have shown that much of the anaemia formerly classified under this heading was in reality secondary to infections with malaria, ankylostomiasis, kala azar, etc. He suggests that the paleness seen in so many people in the Tropics is due to cutaneous ischemia from a reduction of the supply of blood to the surface by contraction of the superficial vessels. This theory, according to him, not only explains the occurrence of tropical pallor but also accounts for the fact of its disappearance in a few days on returning to a cold region.

G. C. L.

TSCHUDNOWSKY. *Acclimatement dans les Pays Tropicaux.*—*Trans. xvii Intern. Congress of Med.* London, 1913. Sect. xxi. Trop. Med. & Hyg. Pt. 2. pp. 63-73.

A paper dealing with the question of the acclimatisation of the white race in the tropics. Physiological arguments are put forward to prove that this is possible and statistics are given. The action of the sun, according to the author, instead of causing tropical troubles, on the contrary destroys pathological germs. He believes that pathological arguments which are brought forward to prove the impossibility of acclimatisation of the white man in the tropics, are defective scientifically and erroneous in their practical interpretation. Finally he concludes (1) that there should be a systematic and methodical cultivation of the soil and adjoining forest; (2) That methodical physical exercise should be adopted in the open air as in temperate zones; (3) That methodical and systematic intellectual exercise should also be practised as at home.

In a discussion which followed Van LOGHEM stated that many of the statistical tables brought forward by the author concerning the Dutch Indies, particularly Deli, Sumatra, were incomplete. [As has so often been pointed out there is something in the tropical atmosphere which is prejudicial to the white man apart altogether from organic diseases.]

G. C. L.

MOUCHET (René). Note sur *Porocephalus moniliformis*.—*Bull. Soc. Path. Exot.* 1914. June. Vol. 7. No. 6. pp. 497–501.

Porocephalus moniliformis, according to the author, is frequently found in the Tropics. He refers to SEIFFERT's autopsies in Kamerun and also to BRODEN and RODHAIN's figures for the Belgian Congo [see also this *Bulletin*, Vol. 1, p. 405]. [According to SAMBON *Porocephalus armillatus* is the African species, *Porocephalus moniliformis* belonging to the Oriental region. The latter name, however, has been used by SEIFFERT and others for the African species.]

The author in a numerous series of post-mortem examinations conducted at the native hospital of Leopoldville in 1911–12 has frequently met with porocephalus larvae. Of 133 adults who came to autopsy 30 were infected, or 22·56 per cent. These cases came from widely distributed areas of the Congo.

In many of the cases the parasites had not set up any perceptible lesions; their number, however, was usually small, rarely over ten. In 32 cases studied a total of 269 larvae were recovered, the following table showing their distribution in the different organs and tissues of the body:—

Encysted in:—

Liver, subcapsular	..	..	..	..	74
Liver, parenchyma	..	..	..	..	69
Intestinal wall	..	..	..	..	25
Mesenteric glands	..	..	..	..	26
Peritoneum; parietal, renal, splenic	..	..	..	..	17
Great omentum	..	..	..	..	17
Mesentery	..	..	..	..	26
Lung, parenchyma	..	..	..	..	9
Lung, subpleural	..	..	..	..	1

Non encysted:—

Fixed by the head to the peritoneum	..	..	2
Free in a lymphatic of the mesentery	..	..	1
Free in the peritoneal cavity	..	..	2

The natural termination of the larva in man, in the author's experience, is calcification. It is not uncommon to find side by side with living larvae calcified cysts, in which the form and striation of the parasites are perfectly recognizable. Adult porocephali were also found in pythons at Leopoldville. Measurements of these are given and the author states that they were determined as *P. moniliformis* by EYSELL of Cassel. [See comment above.] G. C. L.

CORIN (G.). Présence de Larves de Porocéphale chez *Tragelaphus scriptus* (Antilope Rayée Commune).—*Bull. Soc. Path. Exot.* 1914. June. Vol. 7. No. 6. p. 502.

The author reports the finding of porocephalus larvae in a common African antelope, the *Tragelaphus scriptus*. As he says, many animals have been found to harbour these larvae as well as man. They have been found by SCHÄFER in another antelope, *Cephalophus leucogaster*. All the larvae found by the author were encysted and the great majority were living and not calcified. None were seen in a free state. They were found in the liver and spleen, in the intestine, stomach, gravid uterus, peritoneum and mesentery. C. L.

FÜLLEBORN (F.). Ueber die Entwicklung von *Porocephalus*.—*Trans. xviith Intern. Congress of Med.*, London, 1913. Sect. xxi. Trop. Med. & Hyg. Part. 2. pp. 297-298.

This was a very interesting demonstration on the development of the larval forms of *Porocephalus clavatus*. A series of lantern slides was used illustrating the development, these showing very distinctly the encysted parasites in the different tissues and organisms of infected monkeys.

G. C. L.

LANDOIS (Felix) & HOEPKE (Hermann). Eine endoparasitäre Milbe in der Lunge von *Macacus rhesus*. [An Endoparasitic Acarus in the Lung of *Macacus rhesus*.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1914. Apr. 25. Vol 73. No. 6. pp. 384-395. With 1 plate and 3 text figs.

Previous records of the presence of endoparasitic acari are first discussed. Whilst carrying out some experiments on bone transplantation in monkeys the authors discovered in the lung of one of these animals eight to ten rounded nodules, resembling tubercle, but which on fresh examination were found to be due to the presence of a living acarus. These nodules did not communicate with a bronchus and were stained a grey yellow to a light yellow colour. The parasites were examined by Hoepke who gives a detailed description with drawings of them and proposes the name *Pneumotuber macaci*. The paper is illustrated with drawings of the acarus and micro-photographs of its appearance in the lung. The literature of the subject is also given. [Those interested should consult the original.]

G. C. L.

BERNARD (P. Noël). Sur un *Rhizopus* pathogène de l'Homme : *Rhizopus equinus* Lucet et Costantin 1903, variété *annamensis* P. Noël Bernard 1914.—*Bull. Soc. Path. Exot.* 1914. May. Vol. 7. No. 5. pp. 430-437. With 1 text fig.

At the present day three pathogenic species are known in the genus *Rhizopus*: (1) *Rhizopus cohnii* Berlese and Toni 1888, observed by LICHTHEIM in the rabbit for which it is very pathogenic; (2) *Rhizopus niger* Ciaglinski and Hewelke 1893, found in man in a case of black pilous tongue, innocuous to the rabbit; (3) *Rhizopus equinus* Lucet and Costantin 1903, found in the horse and very pathogenic for the rabbit.

The author has now isolated from the expectoration of an Annamite suffering from chronic bronchitis in Hué, Annam, a *Rhizopus* which he describes in this paper. The fungus is very similar to *Rhizopus equinus* but differs from it in the shape of its columella and by its cultural characteristics. These are given in detail, as are also a series of experiments dealing with the receptivity of animals to the infection. Rabbits after the fifth day cease to eat, become seized with violent convulsions and die twelve to thirty-six hours after the commencement of the symptoms. The autopsy shows the organs to be congested and to present on their surface isolated miliary tubercles.

G. C. L.

CASTELLANI (Aldo). Report on Investigation Work carried out at the Clinic for Tropical Diseases and Bacteriological Institute, Colombo, Ceylon, from 1st January to 30th June 1914. Received in Colonial Office Aug. 25, 1914.

The Report deals with research work upon :—

(1) Combined vaccinations.

(2) Fungi found in sprue.

(1) As regards the first heading the author has combined typhoid, para-typhoid A, and para-typhoid B in one vaccine and cholera and plague in another, but now proposes to combine a vaccine from all these five organisms and gives the technique for its preparation. Further, another combination including undulant fever instead of plague and cholera is detailed, as also a combination of dysentery, typhoid and paratyphoid. According to the author, persons inoculated with the above vaccines generally produce combined agglutinins for the different species of bacteria and the amount for different species is not much less than in control individuals inoculated with simple, one-disease vaccines. The only exception, and this a partial one, is in the case of typhoid-dysentery vaccines. Castellani believes that these combined vaccines when efficient are of practical advantage, saving a great deal of time and rendering possible a contemporaneous vaccination for several maladies.

(2) KOHLBRUGGE in 1901 found a fungus in cases of sprue which he identified with the thrush fungus (*Monilia*, *Oidium*, *Endomyces*, or *Saccharomyces albicans*). He made a very complete histological study of one of his cases which ended fatally and emphasised the fact that the fungus in sections of the tongue, etc. had invaded the deep strata of the mucosa, the glands and portions of the submucosa. He concluded that the thrush fungus was the cause of the disease.

From 1909 the author, being interested in the subject of fungi in general, studied the intestinal flora of a number of typical cases of sprue, as well as of other conditions and normal individuals, and has come to the conclusion that there are several different species of intestinal *Monilia*. In practically every case of sprue it is easy to find such parasites in the stools and scrapings from the tongue. A list of these is given, showing the action of the different species on carbohydrate media and their other cultural characteristics. The conclusions the author reaches are as follows :—

"1. In practically every case of sprue it is possible to put in evidence fungi, microscopically or culturally.

"2. These fungi do not all belong to the same species—the so-called 'thrush fungus' or *Monilia albicans*, as stated by Kohlbrugge and all other observers who have confirmed his findings.

"3. As I have stated since several years, there is a plurality of species of such fungi, and the term *Monilia albicans* has been used in the past to cover a large number of different species and possibly different genera, in the same manner as in the past the term *B. coli* was used to cover a great number of different bacteria. As a matter of fact, *Monilia albicans sensu stricto* (*M. albicans*, Robin, 1853, em. Cast., 1909) has never been observed by me in sprue cases, as none of the *Monilias* isolated by me in sprue liquefies gelatine.

"4. The following, probably good species, have been isolated from the stools or scrapings of tongue and saliva of sprue patients: *Monilia*

intestinalis, Cast., 1911; *Monilia decolorans*, Cast. and Low, 1913; *Monilia faecalis*, Cast., 1911; *Monilia tropicalis*, Cast., 1911; *Monilia asteroides*, Cast., 1914. The same patient may occasionally harbour two or more different species. *Monilia intestinalis* and *Monilia decolorans* have so far been found only in sprue cases; the other species have been found in several other conditions besides sprue."

G. C. L.

LEON (N.). Notes de Parasitologie.—*Centralbl. f. Bakt.* 1. Abt., Orig. 1913. Vol. 72. No. 4/5. pp. 380-385. With 6 text figs.

The case of a child, who died in Roumania of asphyxia due to an ascaris passing into the lung, is described. During a fit of coughing, followed by vomiting of an ascaris, the child presented alarming symptoms of asphyxia and died in a few minutes. At the autopsy it was found that an ascaris, which had migrated from the intestine, had passed into the larynx during the fit of coughing, had then descended the trachea, and come to rest in the right bronchus.

The author would not have published the case unless he had also seen analagous ones in dogs. These prove that the parasites may migrate during life and not solely after death.

The second case described is one of Trichorrhaxis nodosa; figures are given showing the affected hairs and the parasites cultured from them. 

The third case is described as creeping disease from Roumania. The patient, a woman aged 42, complained of pains in the back accompanied by intense itching and pricking sensations especially when in bed at night. On examination a red line about 2 mm. broad was noticed on the upper part of the back towards the middle. The progress of this line was noted for fourteen days, during which time the patient remained in hospital. For some days the larva rested during which time all itching ceased. It then began to move again, leaving its characteristic red line. For the last days before leaving hospital no more itching had occurred and the author believes that the larva had either attained its complete development, or had escaped from the skin, or was making a prolonged rest in its subcutaneous travels.

G. C. L.

MÜHLENS (P.). Behandlung bedrohlicher Zustände bei Tropenkrankheiten. [The Treatment of Threatening Conditions in Tropical Diseases.]—*Deut. Med. Wochenschr.* 1914. June 18. Vol. 40. No. 25. pp. 1249-1252.

A general dissertation on the treatment of tropical maladies. Amongst those discussed are amoebic dysentery, Asiatic cholera, sprue, beriberi, plague, yellow fever, dengue, pappataci fever, undulant fever, typhus, bilharziasis and leprosy. The usual remedies employed in these conditions are discussed. Nothing very striking is brought forward in the way of treatment.

G. C. L.

GROTHUSEN. **Salvarsan bei Tropenkrankheiten nebst Bemerkungen über einige tropische Hautkrankheiten.** [Salvarsan in Tropical Diseases with Remarks on Tropical Skin Diseases.]—*Arch. f. Schiffs- u. Trop. Hyg.* 1914. Aug. Vol. 18. No. 15. pp. 515-528.

Reference is made to a previous paper on the treatment of yaws by salvarsan. Sixteen cases of this disease were treated with neosalvarsan with good results. The present paper deals with the treatment of further cases of the same disease, while syphilis, ulcer tropicum, ulcerating granuloma, relapsing fever and other diseases are also mentioned.

The author believes that the drug is best given intravenously. In yaws 83.1 per cent. of the cases were cured by a single injection, but in 16.9 a second was required. In cases of tropical ulcer salvarsan was quite useless. In three cases of ulcerating granuloma a relatively quick cure occurred after the administration of this drug.

G. C. L.

VAN DEN BRANDEN (F.) & DUBOIS (A.). **Notes Préliminaires sur l'Emploi du Néosalvarsan dans Diverses Affections Tropicales.**—*Arch. f. Schiffs- u. Trop. Hyg.* 1914. June. Vol. 18. No. 11 pp. 375-385.

The authors treated 242 native patients with neosalvarsan. Of these 107 were suffering from trypanosomiasis, 77 from yaws and 50 from syphilis. A table giving the complaint from which the patient suffered and the results of the treatment is inserted. Syphilis and yaws were benefited to a remarkable degree, just as with the old salvarsan.

In the trypanosomiasis cases sterilisation of the blood was not so quickly accomplished as with salvarsan, but the authors believe that the remedy influenced the general state favourably. They do not state definitely, however, how many of the cases relapsed subsequently.

Amongst other diseases in which the drug was tried were filariasis, bilharziasis, leprosy and amoebic dysentery.

G. C. L.

RODENWALDT. **Ueber die Verwendung von Levicowasser bei Rekonvaleszenten in den Tropen.** [On the Use of Levico Water for Convalescents in the Tropics.]—*Arch. f. Schiffs- u. Trop. Hyg.* 1914. Apr. Vol. 18. No. 8. pp. 287-288.

A supply of Levico water was sent out to Rodenwaldt by Professor NOCHT for trial in cases convalescing from different diseases in Togo, West Africa.

A series of six persons not specially ill was selected, most of them suffering from loss of appetite, a desire not to work, and nervous debility caused by the intense heat which prevailed during the first five months of 1913. In all the cases the patients responded promptly, the appetite returning and the weight going up. They also slept better and the nervous symptoms largely disappeared.

G. C. L.

MOTAIS (F.), JAMOT (E.) & ROBERT (M. J. F.). **Notes sur la Géographie Médicale du Ouadai.**—*Bull. Soc. Path. Exot.* 1914. June. Vol. 7. No. 6. pp. 522-528.

Ouadai lies to the east of the Chad Basin and has a sub-desert climate. The following diseases were met with:—Tuberculosis rarely, bronchitis, broncho-pneumonia and pneumonia fairly commonly, scarlet fever and measles never; but small-pox was seen. Of tropical maladies ainhum, dysentery, leprosy, mycoses of different sorts, filariasis, elephantiasis, guinea worm, bilharziasis and infantile splenomegalies are mentioned. Malaria is very rare, no doubt owing to the very dry nature of the climate.

G. C. L.

CLARAC. **Principales Maladies Epidémiques observées en Indochine en 1912. Extrait des Rapports de l'Inspection Générale des Services Sanitaires et Médicaux.**—*Ann. d'Hyg. et Méd. Colon.* (Clinique d'Outre Mer). 1914. Apr.-May.-June. Vol. 17. No. 2. pp. 563-571.

The different diseases are given in tabular form. Plague was met with in Cochinchina, Cambodia, S. Annam and the territory of Kouang-Tcheou-wan; cholera in S. Annam, Cochinchina, Cambodia and Laos; relapsing fever in N. Annam and in the Tonkin delta; malaria in epidemic form in Central Annam. In addition amoebic and bacillary dysentery caused numerous deaths in N. Annam, Saigon and Cholon. Of European diseases typhoid fever, small-pox and measles are mentioned. [Those interested should consult the table which is too long for insertion].

G. C. L.

LE ROY DES BARRES (A.). **Fonctionnement de l'Hôpital Indigène du Protectorat à Hanoi pendant l'Année 1913.**—*Bull. Soc. Méd. Chirurg. de l'Indochine.* 1914. June. Vol. 5 No. 6. pp. 238-289.

During 1913, 10,536 patients were admitted to the hospital, representing 208,943 days of treatment. The number of deaths was 792, or 6.6 per cent. The maladies treated are given in a series of tables and the author discusses some of the most frequently seen of these, such as enteric fever, rabies, malaria, recurring fever, beriberi, dysentery, syphilis, yaws, tubercle and malignant tumours. Intestinal parasites were found in 264 patients as follows:—Flukes in 3, taenias in 18, ankylostomes in 129, and ascaris in 214. As regards diseases of the eye trachoma was very common, and as regards intoxications opium mania was not infrequent.

G. C. L.

TODD (John L.). **Paralysis and Tick-Bite.**—*Canadian Med. Assoc. J.* 1914. Sept. Vol. 4. No. 9. pp. 825-826.

Todd writes to say that it is now two years since he suggested that peculiar symptoms might follow the bites of ticks in children in British Columbia. Since that time tick paralysis has been definitely recognised as a clinical condition. As the author says, this paralysis is

something quite apart from the local lesions which may follow at the site of a tick bite, and it is clinically quite distinct from spotted fever. The usual history of such a case is that a young child, perfectly well one day, on the next has more or less complete paresis or paralysis. Sometimes the paralysis is the only symptom noticed, but in addition there may be fever, rapid pulse and other constitutional symptoms. The child may be dull and stupid, and convulsions sometimes are met with. If the tick is not found and removed the child may die, but when it is removed the symptoms gradually disappear and recovery is complete. The rapidity of the onset of the paralysis suggests that the paralyzing agent is a toxin elaborated by the tick, but nothing is known of the way in which the paralysis is produced. The author expresses the hope that every practitioner who meets with such cases in British Columbia will examine them carefully and record his observations.

G. C. L.

ZANNINI (William). *Due Nuovi Casi di Sokodu in Italia.*—*Gazz. d. Ospedali e d. Cliniche.* 1914. June 23. Vol. 35. No. 75. pp. 793-794.

Reference is made to the case of rat-bite disease described by FRUGONI (see this *Bulletin*, Vol. I, p. 409). The author describes two further cases of the disease. Two sisters, eight and five years of age, were bitten one night by a rat. The lesions healed in two or three days, but sixteen days afterwards the children became ill, the bites showing inflammation. The symptoms exhibited were typical. For treatment electrargol was employed, apparently with successful results, the complete duration of the disease being only about three months. At the time of writing the children were in perfect health.

G. C. L.

NIXON (J. Hobart). "Rat-Bite Fever" caused by a Ferret. (Memoranda).—*Brit. Med. Jl.* 1914. Oct. 10. p. 629.

A man was bitten by a ferret whilst catching rats. The wound, inflicted on the thumb, was small and no particular attention was paid to it. On the third day it became inflamed and the glands in the axilla painful. In addition to these local symptoms there was extreme weakness, shivering, sweats and a temperature of 104° F. In four days these symptoms had disappeared, but a week later they recurred, and on this occasion an erythematous rash appeared near the wound, which had now completely healed. Another relapse appeared ten days later, and on this occasion the erythematous patches invaded the arms and chest also. The patient was treated by inunctions of mercury and did well.

The author, on looking up the literature, found that a similar case had previously been described.

G. C. L.

WHITAMORE (V. N.). **Some Observations on Anaemia occurring among Indian Troops stationed in Singapore 1912-1913.**—*Indian Med. Gaz.* 1914. Sept. Vol. 49. No. 9. pp. 342-345.

The observations were based upon one and half years' medical charge of the 3rd Brahmans, stationed in Singapore from July 12, 1912, till April 8, 1914. As regards the cause, nothing definite was ascertained, but the condition was widespread, the general course of the symptoms being very similar in the different cases. These were loss of appetite, marked pallor, asthenia, wasting, and in most cases an intermittent temperature of variable duration. Two conditions that might give rise to such symptoms, which presented themselves to the author's mind, were chronic malaria and ankylostomiasis. As regards the former, the proximity of an extensive swamp which harboured anophelines was suggestive, but the absence of a malarial history prior to admission for anaemia in some cases, the negative results of repeated blood examinations, and the failure of quinine as a remedy, make it difficult to accept a malarial origin. On the other hand, though the symptoms clinically resembled those found in ankylostomiasis, repeated examinations of the faeces by different observers at different laboratories failed to show any ova of these parasites. Though this was so, thymol was given an efficient trial. In some instances emetine seemed to do good, especially in cases with intestinal symptoms. For general treatment, however, arsenic or some of its compounds was found to be the most useful drug, checking, and in some instances improving, the condition.

G. C. L.

WICK. **Gundu in Neu-Guinea.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. June. Vol. 18. No. 12. pp. 403-407. With 2 figs.

The author reports the presence of goundou in New Guinea, and the photographs he gives of the condition show that his diagnosis is correct. In considering the differential diagnosis of the condition he states that leprosy, rhinoscleroma, sarcoma, syphilis and yaws must be excluded. He treated his case in the following manner:—First with injections of neosalvarsan on the assumption that syphilis or yaws might have something to do with the condition, but no amelioration took place. After that he injected fibrolysin into one side of the tumour. Owing to the hardness of the tissues, the injections were difficult and much pain was caused. After the eighth injection a small gangrenous place appeared. The dead tissue was ultimately thrown off. After this the ulcerative surface left gradually granulated up and eventually healed. Owing to the patient having to leave by steamer, the treatment could not be continued. The author, however, hopes to obtain further information about the patient at a later date.

G. C. L.

PEIPER (Otto). **Meningitis, Urinphlegmone, Gundu, Phagedänismus.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. May. Vol. 18. No. 9. pp. 306-317.

During the author's stay in Daressalam he saw frequent cases of meningitis, many severe and fatal.

As regards goundou an interesting case is described. The patient, 35 years of age, presented two almond-shaped swellings of bony hardness,

one on each side of the nose. Pressure on these did not cause pain and there was no obstruction to the nasal passages. There was also no hypertrophy of the nasal mucous membrane nor was there any nasal catarrh and running of tears. The patient, who came from Muansa in the hinterland, said that both the swellings appeared at the same time, between the age of twelve and fourteen, and that for some weeks there were pains in the nose and forehead. Though an intelligent man he could not remember whether he suffered from nasal catarrh and a running from the nose. No history of syphilis was obtainable, but in childhood the patient had suffered from yaws.

G. C. L.

i. COUCHOUD (P. L.). **Le Kubisagari (Maladie de Gerlier).**—*Rev. de Méd.* 1914. Apr. 10. Vol. 34. No. 4. pp. 241–296. With 4 text figs.

ii. CONCHOUD [COUCHOUD] (P. L.) & SHIONOYA (F.). **Clinical and Bacteriological Study of the Kubisagari Disease.**—*Sei-I-Kwai Med. Jl.* 1914. June 10. Vol. 33. No. 6. (Whole No. 388). p. 35. (The Original in *Jl. Tokyo Med. Assoc.* Vol. 27. No. 22.)

i. The author points out that Kubisagari has only been observed in two parts of the world—namely, on the Franco-Swiss frontier and in the north of Japan. The present observations are the result of researches carried out by the author during the course of a voyage to Japan. The characteristic symptoms described by GERLIER in the first cases seen in Switzerland are detailed and then the observations of MIURA on the disease as occurring in Japan. The author was fortunate in being able to see a considerable number of cases, records of no fewer than 33 being given, while excellent photographs of some of these are incorporated in the text. Bacteriological researches were also carried out, and a coccus was isolated from some of the patients. The characteristic features of this organism on different culture media are described, together with a series of experimental inoculations into cats. It is finally noted that the disease exists as a malady of horses and cows in Japan, an observation also made by GERLIER on Lake Geneva.

ii. The chief symptoms found in this peculiar disease are as follows :—During the attack there is ptosis, cloudiness of the field of vision, hanging down of the head and neck together with paresis of the majority of the muscles of the body, especially the extensors. Individual differences in the symptoms are sometimes noticed. There may be, for example, differences in the degree and number of the attacks, and secondary phenomena such as diplopia and pain during the illness may be present or absent.

Bacteriologically the authors isolated two kinds of cocci—one from the cerebrospinal fluid, the other from the milk of the patients.

[This disease is also known by the name of endemic paralytic vertigo and is characterised by ptosis, dimness of vision and paralysis as stated above. It was first described by GERLIER in Switzerland in 1886 and by MIURA in Japan in 1894. The etiology is unknown, but some observers have noticed an association of the disease with stables.]

G. C. L.

- DIAZ (E.). i. *Adenomycose endemica* (Nova Molestia humana). (1a. Nota prévia). [Endemic Adenomycosis; a New Disease of Human Beings. A Preliminary Note.]—*Brazil Medico*. 1914. Apr. 8. Vol. 28. No. 14. pp. 133-134.
- ii. *Nova Molestia humana?* (*Adenomycose endemica*) (2a. Nota prévia).—*Ibid.* Apr. 22. No. 16. pp. 153.

i. In this short preliminary note the author describes a hitherto unrecognised disease, which is to be met with in the mining provinces of Brazil. He proposes for it the name of endemic adenomycosis, because it consists of a symmetrical enlargement of the glands of both sides of the neck apparently due to the invasion of a spore-bearing mould. The symptoms usually begin with the painless enlargement of a single gland, but the disease rapidly extends to all the glands of the anterior triangle of the neck on both sides, so that a voluminous bilateral tumour is formed. The glands of the posterior triangle appear to be always exempt, nor is there any extension to the glands of other parts of the body, not even to those in the axillae. After the lapse of a few months fever and cachexia supervene, with enlargement of the liver and spleen, and eventually the patient dies, after perhaps two or three years from the commencement of symptoms. The disease appears to be always fatal, and attacks persons of all ages. The affected glands are not painful to the touch and never suppurate. The blood shows a considerable reduction in the amount of haemoglobin and a moderate reduction in the number of red cells, while the leucocytes may amount to 20,000 per cubic mm. The disease appears to be absolutely distinct from both tuberculosis and syphilis and is in no way benefited by antisyphilitic remedies, except that iodide of potassium in some cases seems to produce some slight alleviation of the symptoms. It also differs manifestly from Hodgkin's disease.

From the expressed juice of affected glands and the blood of patients the author finds that he has been able to cultivate, with great certainty, a spore-bearing mould which kills laboratory animals by septicaemia, producing in some cases, in them also, a similar glandular enlargement. On Sabouraud's maltose medium, after 3 or 4 days, a growth is obtained of small prominent, slightly moist, yellow colonies which coalesce and after the lapse of about 20 days develop a white filamentous mass of spore-bearing hyphae, the same type of growth being obtained upon potato and carrot, either glycerinated or not.

In smears of gland-tissue and blood from inoculated animals similar spores are to be detected under the microscope, and the disease can be thus transmitted from animal to animal. Further particulars are promised.

It is stated that the disease described by FRANCHINI, also from Brazil, from which his *Haemocystozoon brasiliense* was isolated, corresponds exactly with this disease (see this *Bulletin* Vol. 2, pp. 45 and 46).

ii. In a further note the author gives a more detailed account of the cultural characteristics of the mould. On maltose agar, after the lapse of two to four days, small points of culture appear, of a creamy aspect, and of a café-au-lait colour, having a smooth surface and sharp edges. At the end of 15 days, more or less, the colonies have the following appearance:—The diameter is about 3 centimetres,

and in the centre the surface is slightly wrinkled, with a series of symmetrical furrows all round. After the lapse of a further 30 days a growth of aerial hyphae appears, at first white but afterwards turning slightly yellow. The spores, of oval form, are from 2 to 3μ in length and are arranged either in clusters or chains. The hyphae sometimes form bundles as much as 4 cm. in length by 1 mm. in diameter. The development of the spores can be conveniently watched in hanging-drop cultures of maltose broth. They swell up and elongate into septate hyphae, which at the margin of the drop become aerial and present the characters of the growth on solid media.

As the author cannot find that this mould has been previously described, he proposes for it the name of *Adenomycosis cruzi*. A further description is promised of the microscopic appearances presented by the infected glands and the blood of patients, with illustrations.

[J. B. N.]

CANTLIE (James). Some Aspects of Surgery in the Tropics.—*Trans. Soc. Trop. Med. & Hyg.* 1914. June. Vol. 7. No. 6. pp. 195-210.

The author began his paper by stating that as regards the actual performance of surgical operations there was no essential difference in the manipulations necessary whether the operations were conducted in the temperate or torrid zones, but that surgeons practising in warm climates had to deal with certain ailments more frequently than their fellow workers in the north. Chloroform was the favourite anaesthetic in the tropics, and there was no reason to think that it would be supplanted.

As regards hepatic abscess—one of the common tropical conditions—the author believed the use of emetin had made the treatment much more encouraging. The destruction of the amoebae, even after an operation had been performed, lessened the period of drainage necessary and hastened the healing of the abscess. As regards the operation itself, he laid down the following rules:—

"1. When in doubt as to the presence of pus, and emetin or ipecacuanha has not relieved symptoms, explore the liver for pus.

"2. When the right half of the liver is invaded by pus, or the abscess is supra-hepatic, explore by a hollow needle, introduced between the right ribs, that is, transthoracically.

"When the left half of the liver is the seat of pus, cut down upon the part from the abdominal wall in front, and after packing off the exposed part explore by a hollow needle, or open the abscess straight away.

"3. When the pus is found, transthoracically, introduce a trocar and cannula, remove the trocar, and through the cannula introduce a rubber tube, stretched upon a metal rod, so that a rubber tube larger than the lumen of the cannula can, when so stretched, be passed to the bottom of the cavity of the liver. Withdraw the cannula over the stretched tube, and slackening the rubber allow it to contract towards the bottom of the cavity. Withdraw the metal rod from the tube which is now *in situ*. Fix a syphon arrangement to the drainage tube, conduct it over the side of the bed to a bucket on the floor. Should drainage be too severe, as indicated by the presence of blood in the discharge after, say, 6 to 12 hours later, raise the bucket nearer to a level with patient's body, and thus lessen the intensity of the syphonage. When bile begins to

flow through the tube, say, after a week or two, or three, stop the syphonage and gradually withdraw the tube, shortening it from day to day, or substitute a smaller tube.

"4. When the abscess declares itself in the epigastric regions cut down upon it in the usual way, expose the liver, pack the part round with gauze, open the abscess, insert one or two drainage tubes the size of the forefinger, and deal with the wound on ordinary surgical principles. It is quite possible to use the trocar and cannula and syphonage for pus in the left half of the liver, and when unhygienic surroundings forbid opening the peritoneal cavity to reach the left lobe, use the trocar and cannula and syphonage.

"5. Emetin should be given systematically whilst the abscess is draining."

During the past twenty-five years the author had himself operated upon 142 cases by the method described, with 115 recoveries and 27 deaths.

The surgery of the colon was also described and conditions necessitating the removal of the spleen. Of these the chief was rupture, generally as a result of traumatism. The organ had, however, also been removed for simple splenic anaemia, 87.5 per cent. of such cases recovering and being cured. When cirrhosis was present in the liver as well as the spleen (Banti's disease) recoveries were much fewer—e.g., only about 50 per cent. The new theory of the connection of gall bladder troubles, gall stones, cirrhosis of the liver, haemolytic jaundice, and even cholecystitis, with diseases of the spleen and the treatment by splenectomy opened up, he believed, "a clinical factor of intense interest and a new venue of work for the surgeon."

Time did not permit of a discussion of the surgery of filariasis, bilharziasis, oriental sore, goundou and other tropical conditions.

G. C. L.

LOISELET. Note sur un Procédé rapide pour faciliter l'Asepsie des Injections hypodermique.—*Rev. de Méd. et d'Hyg. Tropicales.* 1914. Vol. 11. No. 1. p. 24.

The writer, who is Professor at the French Faculty of Medicine at Beyreuth, makes use of chloroform, which has the property of taking up water and killing micro-organisms instantaneously, for sterilisation in hypodermic injections. The needles are kept in carbolised oil. When he wants to inject he takes a needle from the oil, adapts it to the syringe and draws up purified chloroform several times into the body of the syringe. He then takes up the solution for injection. A drop of tincture of iodine is placed on the skin, which is not otherwise disinfected, and the puncture is at once made so that the needle takes with it a little of the iodine solution. Needle and syringe are afterwards cleaned again in the chloroform and the needle is replaced in the carbolised oil. It is not necessary to boil the instruments. The author uses purified chloroform, not anaesthetic chloroform. He has thus made many thousand injections, the majority with quinine, without any accident.

A. G. B.

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