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THE LARGE FLOWERED DILLENA.
Dillenia indica, Linn.
(about $\frac{1}{3}$ nat. size)



JOURNAL
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Bombay Natural History Society.

APRIL, 1936.

VOL. XXXVIII.

No. 3.

SOME BEAUTIFUL INDIAN TREES.

BY

THE LATE E. BLATTER, S.J., PH.D., F.L.S.,

and W. S. MILLARD, F.Z.S.

PART XX.

(With two coloured plates and one black-and-white plate).

(Continued from page 231 of volume xxxviii).

THE LARGE-FLOWERED DILLENIA.

Popular Names: *Chalta* (Hind., Beng.); *Mota karmal* (Mar.); *Karambali Thabyu* (Burm.).

Dillenia indica Linn. Sp. Pl. (1753), p. 535, (Syn. *D. speciosa* Thunb.). Belongs to the family *Dilleniaceae*. *Dillenia* in honour of J. J. Dillenius (1684-1747), botanist and professor at Oxford, and author of important botanical works; *indica* after its habitat—India.

Description: An erect evergreen tree, which in favourable localities grows to a height of 30 or 40 ft. Its spreading branches form a dense rounded crown of handsome bright green foliage. The bark is smooth, red and moderately thick. It peels off in small hard scales. The leaves grow at the ends of the branches. The leaf-stalk is channelled, about 1-2 in. long, its base partially encircling the supporting branch. An average leaf is 8-12 in. long and 4 in. in breadth. It is oblong lance-shaped with a finely pointed apex and sharply toothed margins. The close-set nerves running in regular parallel lines to the marginal teeth give the leaves a beautiful deeply fluted surface. The upper part of the leaf and the nerves beneath are covered with fine hairs. The large fragrant white flowers appear singly at the ends of the branches. They may exceed 6 in. in diameter. The club-shaped stalk of the flower is

3 in. long, round and smooth. The calyx is composed of five fleshy rounded and concave sepals, which persist and form the outer covering of the fruit. The five large petals are oblong and heavily crinkled. The numerous stamens form a yellow crown round the white spreading rays of the stigma. The fruit is large and hard. With the sepals which surround it—it measures from 3-4 in. across. Internally it is fleshy and its many flat seeds are embedded in a glutinous pulp.

Flowers: The flowers appear in June and July.

Distribution: Moist and evergreen forests of the eastern sub-Himalayan tract, Assam, Burma and the Indian peninsula: Chiefly found along the banks of tropical forest streams and rivers and other damp places, on deep rich moist soil.

Uses: Planted as an ornamental tree. The thick sepals have an agreeable acid flavour and are eaten by the natives. When added to syrup they are used as a cough mixture (Dalzell and Gibson).

Gardening: *Dillenia* is readily propagated from seed but with difficulty from cuttings (Bailey). The tree reproduces satisfactorily from coppice-shoots, as in the Holongapar coppice coupes, Assam (Troup). Growth is moderately fast.

The fruits are buoyant in water, and those which drop into the streams from the trees along their banks are carried down until stranded. Wild elephants eat the fruits, and are probably agents in the spread of the seed. Under ordinary conditions, however, the seed has no means of escaping from the fruit owing to the rigid covering of the thickened sepals, and Nature's method of overcoming the difficulty is interesting. The fruit on reaching the ground quickly turns brown, decays and, in the hot season, shrivels into dry masses. White ants eat out the interior and fill the dry shell with earth. The seeds, however, remain untouched, and at the commencement of the rains they germinate in the earth accumulated by the white ants, and the seedlings burst through the many cracks and joints of the dried shell (see Troup, vol. i, p. 2).

THE KLEINHOVIA.

Popular Names: (None known).

Kleinhovia hospita Linn. Belongs to the order *Sterculiaceae*.

The species was described first in Linnaeus' *Specie Plantarum*, Ed. 2, as 'Kleinhof horti Bot. cultor in Java'. Nairne (*Flowering Plants of Western India*) says: 'A doubtful native (D) but pretty widely distributed in India (H.)'.

In regard to the derivation of the name *Kleinhovia*, by the courtesy of Mr. C. A. Backer of Heemstede, formerly botanist at Buitenzorg, we quote the following:

'Linnaeus' correspondent was Christian Kleynhoff, born (year unknown) at Sandau in Upper Silesia, who was a Government physician for three years in West India and for twenty-one years in East India and from 1741 or 1742, a civil officer of the V.O.I.C. (United East India Company). He had a garden at Batavia in which many native and Chinese medicinal plants were





Flower of *Dillenia indica*, from a tree in the People's Park, Madras. July, 1935.



THE KLEINHOVIA TREE.
Kleinhowia Hospita, Linn.
(about $\frac{1}{2}$ nat. size)

Illustrated from the collection of the British Museum, London.



Tree of *Kleinhovia Hospita* in the Agri-Horticultural Society's Gardens, Madras.



Flowers of *Kleinhovia hospita*. The Agri-Horticultural Society's Gardens, Madras. September 21st, 1935.

grown. He returned to Holland in 1763 and died at Culemborg, Holland, in 1777.

Mr. Wm. T. Stearn, Librarian, Lindley Library, Royal Horticultural Society, London, has kindly supplied the following note on the specific name *Hospita*:

'*Hospita* is the feminine of *hospes*—a visitor, guest or stranger. Burmann's account of Kleynhoff's generosity in distributing plants and seeds suggests that the specific name (*Hospita*) refers not to a property of the plant *Kleinhovia* itself but to the hospitable Kleynhoff himself. The capital H for *Hospita* is I presume used by Linnaeus because *Hospita* is here a noun in apposition, not an adjective in agreement, in the same way as Linnaeus adopted a capital letter for generic or vernacular names used as a specific epithet, e.g. *Epidendrum Vanilla*, *Schinus Molle*, etc.'

Description: This is a moderately-sized tree with large leaves and showy panicles of delicate rose pink flowers. The leaf is oval, often with a heart-shaped base. Its nerves 3-7 in number grow out fan-wise from the base. The small flowers grow in large many-branched clusters. The fine sepals of the flower fall off early leaving only the pink unequal petals, the uppermost of which has a long claw-shaped apex. The stamens unite to form a slender column, which widens into a cup, bearing in each of its five divisions three 2-celled antlers. The ovary is 5-celled and lobed and lies in the cup formed by the stamens. The style is slender, the stigma divided into five parts. The fruit is a membranaceous, inflated capsule. The seeds are marked with small tubercles.

Flowering season: July to August.

Distribution: The tree is indigenous to the delta of the Mekong River. It is common on the shores of the Malay Archipelago and grows inland in Tropical East Africa and Australia. It was introduced into Ceylon about 1820 and is now fairly established in cultivation in Western India.

Gardening: A beautiful tree particularly when in bloom and really worthy of cultivation. It is propagated by layers: seeds being rarely procurable.

THE VERNAY SCIENTIFIC SURVEY OF THE
EASTERN GHATS.

(ORNITHOLOGICAL SECTION).

BY

HUGH WHISTLER, M.B.O.U., assisted by N. B. KINNEAR, M.B.O.U.

PART XIII.

(Continued from page 240 of this volume).

Falco peregrinus calidus Latham.

Falco calidus Latham, Index. Ornith., vol. i (1790), p. 41—India.

The Peregrine Falcon is, according to Jerdon, abundant all along the east coast of India, and less so perhaps along the western coast, and this agrees with the information which I received from my Punjabi falconers in the days when I kept my own trained falcons. There is, however, very little accurate information on the point. Jerdon goes on to say that he found it near Trichinopoly and at Calicut and Tellicherry and that many used to be captured at Ramnad. He also tells us that great numbers were captured yearly in the Northern Circars. Colonel Sparrow's collection contains an adult male killed on the Colair Lake on 2 February 1913.

Hume states (*S.F.*, x, 333), that the Peregrine had been killed near Sultan's Battery in the Wynaad, and William Davison says that he identified a pair on the wing at close quarters near Ootacamund on 24 January.

Ferguson says that his collectors secured a single specimen on the backwaters of North Travancore in December 1903 and saw a second bird near the backwater at Quilon.

This completes the published records and the only Presidency specimens in the British Museum are three old skins marked 'Madras' from Jerdon, Wardlaw-Ramsay and the Hume Collection. The Peregrine was not reported by the Survey and for lack of proper specimens I have not investigated the correctness of the subspecific name, which is merely accepted from the *New Fauna*. The bird is of course a winter visitor or passage migrant only.

Falco peregrinus peregrinator Sundevall.

Falco peregrinator Sundevall, Physiogr. Sällst. Tidsskr. Lund, vol. i (1837), p. 177, pl. 4—near Nicobars.

The Shahin was not reported by the Survey, but Jerdon states that it occurs in certain localities in the Carnatic and is known to breed in various parts of the Eastern Ghats. There are specimens in the British Museum obtained at Madras in March 1877 (Hume Coll.) and November (C.L.O. Buck), and Dewar says that one was shot by Mr. D. G. Hatchell in his compound.

On the west, Betts considers it an occasional wanderer into Coorg. William Davison says that it is rare on the Nilgiris and their slopes but that he had noted it occasionally, the last occasion being between Neddivattum and Gudalur. Betts informs me that a pair may nearly always be seen (and presumably breed on) the Gudalur malai, a crag which rises above the Gudalur ghat road.

Kinloch presumably refers to this form when he says that the Peregrine is common on the Nelliampathies, breeding on the precipices of the northern slopes.

In Travancore I find only Jerdon's statement that he had shot it in the state and Ferguson's that one was shot by a Mr. Walch in Trivandrum in November 1893 and presented to the Museum.

The Shahin is doubtless resident in the Presidency but the breeding season is not recorded.

Falco jugger Gray.

Falco jugger Gray in Hardwicke's Illustr. Ind. Zool., vol. ii (April 1834), p. 26—India.

There are only two records of the Lugger Falcon in the Madras Presidency. A bird collected at Pulicat in the Chingleput district is in the Madras Museum, while a male collected by Darling on 5 January 1878 in the Wynnad is in the British Museum.

Falco severus rufipedoides Hodgson.

Falco rufipedoides Anonymous—Hodgson, Calcutta Journal Nat. Hist., vol. iv (1844), p. 283—Hills of India, restricted to Nepal by Stuart Baker, Bull. B.O.C., xlvii (1927), p. 107.

Not met by the Survey. The Indian Hobby is only known to occur in the south-western corner of the Presidency and there is very little accurate information about its status there.

Its occurrence in the Nilgiris is still a matter of doubt. William Davison was under the impression (*S.F.*, x, 333) that he had noticed a pair frequenting the Ibis rocks near Pykara, and Primrose (*J.B.N.H.S.*, xvi, 166) says that though he never met with the bird personally in the Nilgiris he was told that it bred in the Gunjara precipices.

Kinloch considered it not uncommon in the Nelliampathies. In Travancore its occurrence is at least authenticated by three specimens in the British Museum. These are a male with no precise data collected by Bourdillon, a male collected at Kowdiar, South Travancore, on 27 April 1874 (Bourdillon) and a male shot on 14 February 1914 at Aneichardi by Stewart. F. W. Bourdillon thought for some reason (*S.F.*, iv, 354) that the Indian Hobby might breed in Travancore but Ferguson was probably on surer ground in considering it a winter visitor, to be seen on the hills and occasionally in the low country.

In the account of this race in the *New Fauna* (v, 47) the western limit of the distribution is given as Kumaon (misspelt Kuman) in spite of the statement in the next paragraph that Mackinnon took a nest at Murree and others round Mussoorie. This species certainly occurs as far west as Mussoorie for there is a specimen from that place in the Hume Collection. I doubt however whether it breeds at Murree and think that there must be some mistake over the nest supposed to have been obtained there by Mackinnon. In *Nidification* (vol. iv, p. 34) the western limit is extended to Kashmir where it is said probably to breed fairly commonly, but at present the evidence for its occurrence at all in Kashmir is unsatisfactory.

[Falco chicquera chicquera Daudin.

Falco chicquera Daudin, *Traité d'Orn.*, vol. ii (1800), p. 121—Bengal, Chandernagar.

Dewar includes the Red-headed Merlin in his Madras list, but as he makes no comment on the fact and there is no other record for the Presidency I think it is wiser not to admit the species to the Presidency list until further evidence is forthcoming.]

Erythopus amurensis (Radde).

Falco vespertinus var. *amurensis* Radde, *Reis. Ost. Siberien*, vol. ii (1863), p. 102—Blagowestschensk, Amoor, E. Siberia.

The Eastern Red-legged Falcon is only a rare straggler to the Presidency and there is very little detailed information about it. Jerdon states (*B. of I.*, i, 41) that he had killed it in the Nilgiris and the Carnatic and had seen another at Nellore and the former specimen is perhaps the one which Hume refers to in *Stray Feathers* (ii, 529) as being in the Calcutta Museum. Dewar includes it in his Madras list, possibly also on Jerdon's authority. There is

however, an adult male in the British Museum killed in 1871 at Nursipatam near Rajahmundry and the label states that it was obtained by a collector from the Madras Museum.

Falco tinnunculus objurgatus (Stuart Baker).

Cerchneis tinnunculus objurgatus Stuart Baker, *Bull. B.O.C.*, vol. xlvii (1927), p. 106—Nilgiris.

Specimens collected:—245 ♀ 17-5-29 Shevaroy's 5,400 ft.

Measurements:—

| Bill. | Wing. | Tail | Tarsus. |
|-------|-------|-------|---------|
| 23 | 234 | Worn. | 39 mm. |

There is in Southern India—and the fact has been well known from the time of Hume—a small dark resident race of Kestrel which is very largely a mountain bird. Its distribution is not yet fully worked out, but it probably breeds here and there throughout the Western Ghats as James Davidson (*apud* Barnes, *J.B.N.H.S.*, iii, 211) says that a fair number breed all along the ghats in the Nasik district where he shot a young bird unable to fly in May. This specimen from Septashring is in the British Museum and undoubtedly agrees with Nilgiri specimens.

In the Presidency it is recorded from the Wynad where William Davison shot one (♀ juv.: wings and tail not fully grown: in the Hume Collection) near Karote at the foot of the Brahmagherries, and saw two others on those hills. It is common on the Nilgiris and their slopes, frequenting the more open and cultivated tracts and the downs and breeding on the more inaccessible crags. It occurs commonly in the Nelliampathies and Palnis, more particularly at higher elevations in the latter, and also apparently through the Travancore ranges.

On the eastern side our information is meagre, but the specimen obtained by the Survey in the Shevaroy's suggests that it also has some distribution in the Eastern Ghats.

The *New Fauna* (v, p. 65) says that this race is also resident in Ceylon. I have seen no evidence to that effect. Legge clearly considered the Kestrel to be a winter visitor to the island and none of the specimens in the British Museum belong to this race. Wait did not meet with it.

Hume states that the laying season in the Nilgiris is in the last week of February, in March and in April.

The identification of the Survey Kestrels made it necessary for me to go into the general question of what races occur in India as the arrangement of the group in the *New Fauna* is most manifestly unsatisfactory. The *New Fauna* (vol. v, 61-5) admits 5 races in the Indian Empire as follows:—*tinnunculus* as a winter visitor; *interstinctus* breeding throughout the Lower Himalayas from 2,000 ft. to 8,000 ft. and also in the Assam area, wintering in Northern India; *saturatus* breeding in Burma and only a local migrant; *japonicus (japanensis)* breeding in Ladakh and Northern Kashmir and wintering in the Peninsula; and finally *objurgatus* resident in Southern India. The distinctions given between these forms are nebulous and have resulted in very curiously mixed identifications in different collections.

The first point to establish in this enquiry is the identity of the breeding birds of our area and here we are immediately up against the fact that breeding specimens are strangely lacking for identification. I have been through the whole of the Indian Empire series in the British Museum and, apart from specimens of the race *objurgatus*, can only find 4 breeding birds, all from the Western Himalayas. There are no specimens from Assam or Burma in the British Museum, which from their dates are likely to be breeding birds, and Dr. Ticehurst tells me that he has found no definite evidence that any Kestrel breeds in Burma at all. No specimens of probable breeding birds are included in the large collections that he has received from Burma. Luckily I can supply the deficiency in one particular. My own collection contains a good series of birds from Ladakh, Kashmir and the western Himalayas which are known to be breeding birds, in many cases shot for the identification of eggs. This series first of all establishes the fact that there is no difference between the breeding birds of Ladakh, Kashmir or the outer Himalayas down to 2,500 ft.

The series has been most carefully compared with a good series of European birds. In size there is no difference at all.

European birds measure as follows:—

| | | Wing. | Tail. | | Wing. | Tail. |
|---|------|---------|----------|------|---------|-------------|
| Witherby (<i>Hand-book</i> , p. 122) | 15 ♂ | 230-252 | 150-173: | ♀ | 235-265 | — mm. |
| Ticehurst (<i>Ibis</i> , 1923, p. 262) | 20 ♂ | 234-251 | 160-180: | 18 ♀ | 244-261 | 162-185 mm. |
| H. W. Collection | 12 ♂ | 236-256 | 147-165: | 4 ♀ | 252-258 | 169-177 mm. |

This range of variation is very wide and it amply covers the range of measurement in Himalayan breeding birds as follows:—

| | Wing. | Tail. |
|------|---------|-------------|
| 13 ♂ | 232-250 | 154-170 mm. |
| 8 ♀ | 243-264 | 166-183 mm. |

Mr. Stuart Baker (*Bull. B.O.C.*, xlvii, p. 103) in his preliminary discussion says that the few Western Himalayan specimens killed in the breeding season are *all darkish birds* if compared with European specimens. My series, and with this verdict Dr. Ticehurst agrees after a careful comparison of them with European birds, are quite indistinguishable from European birds. They have the same wide variation in colour and markings. The only difference we can find is that some males are *paler* than any European birds we possess, but the percentage of such pale birds is not sufficient to warrant the separation of a Himalayan race. I am therefore satisfied that West Himalayan birds belong to the typical form. The identity of the breeding race (if any) in the Eastern Himalayas, Assam and Burma, remains to be established.

It has long been known that the breeding race of Southern India is separable on size and colour. It is slightly smaller as follows:—

| | Wing. | Tail. |
|------|---------|-------------|
| 10 ♂ | 221-242 | 147-158 mm. |
| 12 ♀ | 234-258 | 145-173 mm. |

The adult male differs from the typical race in the deeper, more foxy, brick-red of the upper parts, lacking the faint wash or bloom characteristic of *tinnunculus*. The top of the head is a duller, darker grey, or even streaked rufous-brown as in the female. The grey tail is apparently always faintly barred. The underparts are well tinged with rufous and the markings on the central flanks are somewhat different in character. The female is a richer brick-red in colour, with heavy barring and the underparts also differ as in the male.

It remains to establish the identity of *Falco interstinctus* McClelland, *P.Z.S.* 1839 (March 1840), p. 154—Assam and *Tinnunculus saturatus* Blyth, *J.A.S.B.*, xxviii (1859), p. 277—Ye, Tenasserim (not Port Blair, Andamans as given in the *New Fauna*, vii, 408), in case either of these should prove to be the same bird as *objurgatus*, which is antedated by both.

Falco interstinctus of McClelland is based on descriptions in Latin and English which are merely generalised descriptions of the immature or female Kestrel and not recognisable as any particular race. Horsfield, however, goes on to explain that the real difference from the typical form is apparently that the male and female are alike in plumage and confirms this with a quotation to the same effect from Sykes. It will therefore be seen that the original describers made no claim to this form being darker, and this arose later from an examination of the supposed McClelland type in the British Museum, which has no exact data but is of the immature type of plumage, a rather dark bird with broad heavy bars. Taken alone it might be considered one of the darker phases of *tinnunculus tinnunculus*, to which all the other Assamese specimens in the British Museum belong in my opinion except a second McClelland specimen which is of a foxy red type.

Tinnunculus saturatus of Blyth from Tenasserim is, on the other hand, definitely said to be a heavily barred bird. There is no reason to suppose that any Kestrel breeds in Tenasserim and all Burmese birds that I have seen belong either to the typical race or to a heavily barred form which is

evidently the bird that Blyth received. With these latter the type of *interstinctus* agrees.

These heavily barred birds I am unable to separate from the Japanese and N. Chinese form *Falco tinnunculus japonensis* Ticehurst (vide *Bull. B.O.C.*, vol. i, p. 10 new name for *F. t. japonicus* Temm. and Schlegel) and I have no doubt that they are winter visitors to the Eastern Himalayas, Assam, Burma, Eastern and Southern India and Ceylon from all of which localities I have seen specimens. This race has a bright foxy phase which is not found in the typical race and to it the second McClelland specimen evidently belongs. Of the three names *interstinctus* is the earliest and will therefore take precedence. *Objurgatus* is easily separated from *interstinctus* in most cases—no one can expect to name all specimens of Kestrels correctly, the species is so variable and the races so difficult to discriminate—by the smaller size, by the richer brick-red colour and the absence of bloom on the back and mantle of the adult male, and by the richly coloured underparts, *interstinctus* having the undersurface as in the typical form, from which indeed many specimens are not separable.

Falco tinnunculus tinnunculus Linnaeus.

Falco tinnunculus Linnaeus, *Syst. Nat.*, ed. x, vol. i (1758), p. 90—Sweden, Europe.

Specimens collected: 1083 ♀ 11-12-29, 1133 [♂] 17-12-29 Cumbum Valley, Kurnool.

Measurements:—

| | Bill. | Wing. | Tail. | Tarsus. |
|-----|-------|-------|-------|----------|
| 1 ♂ | 21.5 | 231 | 161 | 36.5 mm. |
| 1 ♀ | 22.5 | 249 | 159 | 38 mm. |

The typical race of the Common Kestrel certainly occurs as a passage migrant or as a winter visitor in the Madras Presidency, and probably in some numbers, as Major Bates tells me that Kestrels are very common in the plains of the Carnatic in the winter, being about as late as April. In addition to the two Survey birds there are specimens in the British Museum as follows:—♂ 4-1-1869 Salem (Theobald), ♀ 22-1-1881 Ootacamund (William Davison) and ♂ imm. Travancore (Fry). Most of the specimens I have examined from Ceylon also belong to this race.

Falco tinnunculus interstinctus McClelland.

Falco interstinctus McClelland, *P.Z.S.* 1839 (March 1840), p. 154—Assam.

This race also occurs in the Presidency as a winter visitor for there are the following specimens in the British Museum:—♂ immature 15 January, ♀ 19 December 1868 Pothanore, Coimbatore (Carter), ♀ no date Travancore (Fry).

[**Falco naumanni pekinensis** Swinhoe.

Falco cenchris var. *pekinensis* Swinhoe, *P.Z.S.* 1870, p. 442—Ming tombs near Peking.

The Lesser Kestrel is included in Inglis and Baker's *Birds of Southern India*, p. 236, with reference to Jerdon's statement that he found it breeding on the cliffs of the Nilgiris in May and June; but the authors are of course right in discrediting this record. Hume (*Scrapbook*, p. 105) gives the measurements of an adult female said to have been shot near Coonoor by Mr. Carter of Coimbatore. As however the specimen is not in the Hume Collection and it does not appear that Hume ever saw it himself, while the measurements do not rule out the possibility of the specimen being a Common Kestrel, I am not prepared to accept the record.]

[**Aquila nipalensis** Hodgson.

Aquila nipalensis Hodgson, *Asiat. Res.*, vol. xviii, pt. 2 (1833), p. 13, pl. 1 (named on plate only)—Valley of Nepal.

In the *Old Fauna* the southern limit to which the Steppe Eagle penetrates in India in winter was given as Khandesh, Seoni and Raipur, but in the *New Fauna* (v, p. 71) it is said to occur as far south as North Travancore on the authority of Mr. Stewart. As eagles are notoriously difficult to identify and it does not appear that a specimen was preserved for comparison with authentic examples I have some hesitation in accepting this bird on the Presidency list, the extension of range being so great and the country so unsuited to its requirements.]

***Aquila rapax vindhiana* Franklin.**

Aquila vindhiana Franklin, P.Z.S. 1930-31 (October 25, 1931), p. 114—Vindhya Hills.

Jerdon states that the Tawny Eagle is unknown on the Malabar Coast and rather rare in the Carnatic and the only actual records I find for the Presidency are from the latter area. There is a specimen—Dr. Gravely is kind enough to tell me—in the Madras Museum from Poonamallee. Major R. S. P. Bates informs me that he found a nest at St. Thomas' Mount on 31st May. It then contained a single feathered chick which had become a 'brancher' by the end of June.

[***Aquila clanga* Pallas.**

Aquila clanga Pallas, Zoogr. Russo-Asiat., vol. i (1811-1827), p. 351—Russia.

Jerdon states that the Greater Spotted Eagle is tolerably common in the Carnatic and the Malabar Coast but I have traced no more definite record to justify its inclusion in the Presidency list.]

***Aquila pomarina hasta ta* (Lesson).**

Morphnus hastatus Lesson in Bélanger's Voy. Indes Orient: (1834), p. 217—Bengal.

The *New Fauna* (v, 76) states that the Small Indian Spotted Eagle is 'uncommon in Travancore and Madras' but the only authority that I can find for its inclusion in the Presidency list is a female collected at Kotagiri on 15 February now in the Hume Collection in the British Museum.

***Hieraaëtus fasciatus* (Vieillot).**

Aquila fasciata Vieillot, Mém. Linn. Soc. Paris, vol. ii (2), 1822, p. 152—Montpellier, France.

Bonelli's Eagle was not procured by the Survey. It does, however, occur on the eastern side of the Presidency as Jerdon obtained the specimen figured in his Illustrations in the Guindy Park at Madras, and this is doubtless the authority on which Dewar included the bird in his list.

On the western side it is recorded from the Nilgiris and Travancore. In the former hills it is not uncommon according to William Davison and he had also seen it in the plains country at the base of the hills. Bonelli's Eagle is not included in Ferguson's Travancore list but Stuart Baker (*Nidification*, iv, 54) says that Stewart took many nests.

The breeding season appears to be about December in which month Miss Cockburn obtained eggs at Kotagherry (*Nests and Eggs*, vol. iii, 143).

A specimen from 'Madras' (Jerdon) in the British Museum is probably the above from Guindy Park. There appears to be no other Presidency specimen available for examination to verify the statement that South Indian birds belong to the typical race.

***Hieraaëtus pennatus* (Gmelin).**

Falco pennatus Gmelin, Syst. Nat., vol. i, pt. i (1788), p. 272—Hungary.

The Booted Eagle was not procured by the Survey but it appears to be a fairly common winter visitor to the Presidency, keeping apparently to the plains and lower hills. On the western side we have a specimen from Coorg (Wardlaw-Ramsay) in the British Museum, while Hume states (*S.F.*, x, 335)

that it is not uncommon in the Wynaad, whence he had received a pair many years previously. A male from Cannanore (17-10-1882 Wardlaw-Ramsay) and an unsexed bird from Calicut (1873 Hume Collection) are in the British Museum, as well as one 'Anjango' and two 'Madras' specimens. Ferguson states that the Trivandrum Museum possessed only one local specimen killed in February.

On the eastern side Dewar's inclusion of the Booted Eagle in his Madras list is doubtless based on the local specimen in the Madras Museum. A male from Pothanur, Salem district, collected by Theobald on 9 December 1868 is in the British Museum. Jerdon mentions a specimen procured by Mr. Hooper C. S. at Trichinopoly (*Madras Jour. Lit. Sci.*, 1839, p. 75).

Hume (*Scrapbook*, p. 186) described a nest with 2 eggs taken by his collector Mr. Theobald on 21 February 1869 at Hurroor, Salem district, from which the parents, both in the brown plumage, are said to have been shot. This record has been copied from book to book and is included in Mr. Stuart Baker's *Nidification* (vol. iv, p. 56). In my opinion it is quite untrustworthy and I am of opinion that the nest was that of the Common Pariah Kite. The description of the egg is unlike that of the Booted Eagle and agrees with that of the Kite; the breeding of this migratory eagle in Southern India is quite unlikely; and finally Theobald was a most unreliable collector [vide his account of the breeding of Montagu's Harrier in a tree in the same district (*Scrapbook*, p. 305) and of the Long-legged Buzzard in the Salt Range (*loc. cit.*, p. 277)]. The Booted Eagle frequently flies with Kites (cf. Bruce *Amer. Nat.*, vi, 1872, p. 460) and I myself in my early collecting days in India procured my first specimen of the brown phase of the Booted Eagle when I was shooting kites as food for a captive Lämmergaier. No doubt Theobald shot his birds near the nest, not from it.

Lophotriorchis kienerii (Sparre).

Astur kienerii Sparre, *Mag. Zool. Ois.* (1835), pl. 35—Himalayas.

According to the *New Fauna* (v. 81) the Rufous-bellied Hawk-Eagle is found in the 'south-west coast of India from Southern Bombay Presidency to Ceylon' but I can find no record from further north than the Wynaad from where Primrose believed that he had secured a specimen (*J.B.N.H.S.*, xvi, 164). The identity of this specimen appears never to have been confirmed and its present whereabouts is not known. With this exception I cannot trace it further north than the Anamallai Hills where Kinloch found a nest with a young bird in December 1906 (*J.B.N.H.S.*, xvii, 1027). In Travancore it is a resident species but not common. Bourdillon obtained a specimen at 2,000 ft. and thought that he had seen another alive (*S.F.*, vii, 33) and Ferguson shot one at the foot of the hills in South Travancore in April 1901. A supposed specimen of the egg taken on 16 February 1906 is described by T. F. Bourdillon in the *Journal* (xviii, p. 499).

In *Nidification* (iv, 57) Mr. Stuart Baker gives us very complete information of the status of this fine eagle in Travancore on the authority of Mr. Stewart. It is said to breed at all heights from 1,000 to 4,000 ft., but principally between 1,500 and 3,000 ft. while the egg has been taken from 27 November to the end of March.

On the eastern side of the Presidency the bird is not known to occur.

There appears to be no specimen of the Rufous-bellied Hawk-Eagle from the Presidency available for examination unless a female dated 26-10-1876 in the British Museum from the 'Great Valley' is possibly Bourdillon's original specimen. I have not therefore been able to verify the identity of these south-west birds with the Himalayan race.

Ictinaëtus malayensis perniger (Hodgson).

Aquila perniger Hodgson, *J.A.S.B.*, vol. v (1836), p. 227—Nepal.

The Black Eagle is well known on the western side of the Presidency where it must be very generally distributed through the hill jungles. Jerdon states that he saw it in Coorg and Mr. Betts has recorded that he saw one there for about a week in November 1928. Jerdon also saw it in the Wynaad and a nest taken there early in January is recorded by Daly (*J.B.N.H.S.*, xii, 589).

All observers agree that it is not uncommon on the Nilgiris and their slopes, though avoiding the actual plateau and it is also common on the Nelliampathies (Kinloch). In the Palnis Fairbank observed it at three different places about 4,000 ft.

In Travancore Bourdillon and Ferguson considered it a fairly common resident from 500 ft. upwards. Stewart is said to have taken eggs in Travancore between 1,000 and 4,000 ft., the breeding season being apparently from November to February, though one egg was taken on 9th September (*Nidification*, iv, 61). There are 5 specimens in the British Museum from Kotagiri (Cockburn) and Mynali (Bourdillon).

Jerdon tells us that he also saw the Black Eagle on the Eastern Ghats and Mr. LaPersonne reports that he saw a fine specimen on the Shevaroy Hills.

As no specimens were procured by the Survey I have not checked the identification of South Indian birds.

Nisaetus cirrhatus cirrhatus (Gmelin).

Falco cirrhatus Gmelin, Syst. Nat., vol. i, pt. i (1788), p. 274—India.

Specimens collected:—310 ♂ 2-6-29 Chitteri Hills 2,000 ft.; 643 ♀ 3-8-29, 713 ♀ 19-8-29 Palkonda Hills 1,000 ft.

Measurements:—

| | Bill. | Wing. | Tail. | Tarsus. |
|-----|-------|---------|---------|---------------|
| 1 ♂ | 41 | 308 | 278 | 100.5 mm. |
| 2 ♀ | 45-46 | 424-434 | 284-288 | 102-102.5 mm. |

The Crested Hawk-Eagle is found on both sides of the Presidency. On the eastern side there is a record from Chatrapur, Ganjam (where a Captain Pritchard shot a specimen on 7 March 1904). As the bird had been particularly noticed about since the preceding November and the same gentleman was said to have killed one previously in 1895 it is obvious that the species was not considered common in this area (C. E. C. Fischer, *J.B.N.H.S.*, xv, 716).

Jerdon states that he obtained this eagle in the Eastern Ghats and doubtless some of the six specimens marked 'Madras' in the British Museum came from the Eastern Ghats, but the three Survey specimens supply the only other precise records from this side. Mr. LaPersonne remarks regarding them that many were observed in the forest round Ballepalle and that in the Chitteri range its call might be heard daily.

On the west both Hume (*S.F.*, x, 336) and Primrose (*J.B.N.H.S.*, xvi, 165) state that the Crested Hawk Eagle occurs in the Wynnad and the Nilgiris and a male collected by William Davison on 28-4-1876 at Segore is in the British Museum. Kinloch says that it is very common in the Nelliampathies.

There appears to be no record of the breeding season in the Presidency.

With reference to the note on the identity of the 'Devil-bird' given *ante* (p. 233) it may be remarked that Dr. Spittel in Ceylon was convinced (for reasons given in full *J.B.N.H.S.*, xxx, 914) that this eagle is the author of the nocturnal cries. Mr. LaPersonne is of the same opinion after his visit to the Chitteri range.

Nisaetus cirrhatus ceylanensis (Gmelin).

Falco ceylanensis Gmelin, Syst. Nat., vol. i, pt. i (1788), p. 275—Ceylon.

This race of the Crested Hawk-Eagle is stated by Mr. Stuart Baker (*New Fauna*, v, 86 and *Nidification*, iv, 64) on the authority of Mr. Stewart to be very numerous in the south of Travancore. It is said to breed from the foothills upto about 2,500 ft.; and eggs are usually laid in January and February, though Stewart has taken them from early December to the end of March.

The only specimen which I have examined is an 'Anjango' bird in the British Museum which is the type of Hume's *Spizaetus sphyx* (*S.F.*, i, 319).

Nisaetus nipalensis kelaarti Legge.

Spizaetus kelaarti Legge, *Ibis* 1878, p. 202—Ceylon.

This race of Hodgson's Hawk-Eagle is confined to the western side of the Presidency. Hume received an adult specimen from the Nilgiris (*S.F.*, iv,

446) which was given him in June 1872 by Mr. F. L. Chapman of Ootacamund (*S.F.*, x, 336) though the racial identification was never confirmed. Mr. Betts informs me that he shot one in his bungalow compound 4 miles from Nedivat-tam.

In Travancore, according to Ferguson it is rare and confined to the hills. Three specimens obtained by Bourdillon at Mynall (♂ 18-12-76, ♀ 9-7-78, ♀ juv. not dated) are in the British Museum. Stuart Baker states on the authority of Stewart that the bird breeds between 1,000 ft. and 4,000 ft. (*Fauna*, v, 91; given as 3,000 ft. in *Nidification*, iv, 68) and that the breeding season lasts from early December to the end of March, most eggs being laid in January.

Circæus ferox (Gmelin). *Olim Circæus gallicus* (Gmelin).

Accipiter ferox S. G. Gmelin, Nov. Comm. Acad. Petrop., xv (1771), p. 442, pl. x—Astrakan, S. Russia.

The only record of the Short-toed Eagle which I can trace for the Presidency is the statement by Stuart Baker (*Nidification*, iv, 69) that Stewart took two or three nests in Travancore.

For the change of name from the time-honoured *Circæus gallicus* (Gmel.) see Grant, *Ibis* 1934, p. 644.

Haematornis cheela melanotis (Jerdon).

Buteo melanotis Jerdon, Madras Jour. Lit. Sci., vol. xiii (1844), p. 166— at the foot of the Nilgiris.

The status of the Crested Serpent Eagle on the eastern side of the Presidency appears to be quite unknown. Jerdon met it at Goomsoor. Dewar includes it in his Madras list without any comment and I have a note that it breeds at Yercaud but cannot trace the authority for either statement. On the west it is well known. In Coorg, according to Betts, it is common though not numerous, and William Davison and Primrose (*J.B.N.H.S.*, xvi, 165) both state that it is not uncommon in the Wynnaad.

In the Nilgiris according to Davison it does not occur on the higher hills and is uncommon on the slopes, becoming more numerous at the foot of the hills. Kinloch calls it common in the Nelliampathies but in the Palnis Fairbank only saw a single pair.

In Travancore Ferguson says that it is fairly common in the low country and also on the hills. This statement is expanded by Stuart Baker on the authority of Stewart. He considers that there are two races in the country, of which the larger called *H. c. minor* is very common in the plains and foothills, and the smaller, considered identical with the Ceylon bird *spilogaster*, is found in some numbers between 500 ft. and the highest hills, but most commonly between 500 and 2,000 ft. The breeding season of the larger bird is given as December to March and of the smaller as January to March (*Nidification*, iv, 72-75). To anyone who knows this eagle in life this altitudinal difference of races cannot seem satisfactory. The chief characteristic of the bird is its propensity for soaring very high in the sky, so it is hard to believe that birds which must meet daily in their common playground the air can segregate into two races, one breeding from sea level up to 500 ft., the other above the 500-foot contour. The evidence on the point also can hardly be very strong as in the *New Fauna* Mr. Stuart Baker, again on the authority of Stewart, states (vol. v, p. 99) that *minor* breeds in the plains and on page 101 that it is confined to the higher and drier ranges where the forest is almost deciduous, while on the latter page *spilogaster* is said to be resident in the wetter evergreen forests at the lowest elevations and sea levels. A similar confusion over the breeding ranges of *H. c. cheela* and *H. c. minor* occurs in *Nidification*, vol. iv, pp. 71 and 73, the breeding bird of Nadia being attributed to each in turn.

The explanation is, I think, that sufficient allowance has not been made for the fact that the Crested Hawk-Eagle—like many other birds-of-prey—is a species with a good deal of individual variation, both in colour, amount of spotting and barring, the colour of the undertail coverts and size. The grease staining on the lower parts of many skins in the British Museum has also been mistaken for true colouration.

The situation as regards India and Ceylon appears to me to be as follows. The typical race breeds along the Himalayan foothills and the neighbouring forest areas as far westwards as Kangra and Gurdaspur, visiting also the Indo-Gangetic Plain in winter. This race has the chin and throat blackish, the breast somewhat barred and the tail-bar almost pure white. It is also very large:—

| | Bill. | Wing. | Tail. |
|----------------------------|---------|---------|-------------|
| 3 adult ♂ Punjab foothills | 42-50 | 472-479 | 290-305 mm. |
| 2 adult ♀ Punjab foothills | 47.5-48 | 482-484 | 299-304 mm. |

Birds from the Peninsula southwards to Travancore and also from Ceylon all appear to me to be similar in colouration, except for individual variation. The chin and throat do not usually become black, the breast is generally uniform and the tail bands are grey, not white. They show a steady diminution of size from north to south, obscured no doubt again by individual variation, and most marked in Ceylon. On size alone I would, therefore, separate the Cinghalese bird *H. v. spilogaster*:—

| | Bill. | Wing. | Tail. |
|------------------|-------|---------|-------------|
| 4 adult ♂ Ceylon | 41-44 | 370-389 | 222-240 mm. |
| 3 adult ♀ Ceylon | 42-44 | 384-398 | 240-250 mm. |

I have not been able to trace the specimens collected by Stewart and have only been able to examine 4 males from Travancore. These measure:—bill, 43-46; wing, 387-434; tail, 244-279; which is clearly larger than Cinghalese specimens and agrees well with 4 males from Kanara:—bill, 44-46; wing, 390-431; tail, 250-265 mm.

I therefore attribute all birds from Travancore to the continental form and for this Jerdon's name *melanotis*, wrongly given in *New Fauna*, vii, p. 410, as a synonym of the typical race, takes precedence of *minor*.

Butastur teesa (Franklin).

Circus teesa Franklin, P.Z.S. 1830-1831 (October 25, 1831), p. 115—Between Calcutta and Benares and in the Vindhyan Hills between the latter place and Gurra Mundela.

Not found by the Survey. The White-eyed Buzzard is far scarcer in the Presidency than in the rest of India and on the eastern side I only know of a male in the British Museum collected by Blanford north-west of Rajahmundry on 29 May 1871 and a local specimen in the Madras Museum, the basis for Dewar's inclusion in his list.

On the west it is only recorded from Travancore where Ferguson says it is not uncommon in the low country but does not ascend the hills.

Haliaeetus leucogaster (Gmelin).

Falco leucogaster Gmelin, Syst. Nat., vol. i, pt. i (1788), p. 257—no locality—New South Wales.

How far the White-bellied Sea-Eagle is distributed along the wide-flung coast-line of the Madras Presidency is not certain but it has as yet only been recorded from a few localities. There are two 'Madras' specimens in the British Museum, as well as a bird in the Hume Collection from Narasapatam, Vizianagaram. An interesting note by Mr. S. C. Law on two pairs observed by him at Vizagapatam will be found in the *Journal* (xxix, 1059). Dewar includes the species in his Madras list without comment. Jerdon (*Madras Jour. Lit. Sci.*, 1839, p. 65) says that he saw it over the Chilka Lake, at Ponay and again near Calicut.

Ichthyophaga ichthyaetus (Horsfield).

Falco ichthyaetus Horsfield, Trans. Linn. Soc., vol. xiii, pt. i (May 1821), p. 136—Java.

I can find no information about the Large Grey-headed Fishing-Eagle in the Presidency except the statement (*Nidification*, iv, 82) that Stewart found it breeding in Travancore and Betts' record from Coorg. The latter states

that the only pair he had seen haunted a small tank in the jungle on the Coorg-Mysore frontier where they had an eyrie up in a tree.

Hume considered (*S.F.*, v, 129) that Indian birds were smaller than Javan. So in the absence of specimens I have kept the name binomial.

Haliastur indus indus (Boddaert).

Falco indus Boddaert, Tabl. Pl. Enlum. (1783), p. 25 for Pl. Enl., 416—Pondicherry, India.

Specimens collected:—302 ♀ 1-6-29 Chitteri range 2,000 ft.; 507 ♂ 25-7-28 Tindivanam near Pondicherry.

Measurements:—

| | Bill. | Wing. | Tail. | Tarsus. |
|-----|-------|-------|-------|---------|
| 1 ♂ | 34 | 371 | 194 | 51 mm. |
| 1 ♀ | — | 391 | 200 | 49 mm. |

The Brahminy Kite is a very common resident and generally distributed in the Presidency though there is no record of it north of the Godavery Delta where LaPersonne found it common on the river. It is exceedingly abundant about Madras itself, and in Salem district LaPersonne found it fairly common around villages, ascending also the Shevaroy and Chitteri Hills. In this area Foulkes (*J.B.N.H.S.*, xvi, 757) had an interesting experience in the Pikkili Hills in April, watching 600 birds collect nightly to roost.

On the western side Betts says that it is occasionally seen, though far from common, in Coorg. It is much more common in the Wynaad, according to William Davison, being found in every paddy field. All observers agree that the Brahminy Kite is less common in the Nilgiris, though a few may always be seen about the lake at Ootacamund. In none of the western ranges does it normally breed.

A note on this species catching termites with *Milvus m. govinda* at Geddesal, Coimbatore, will be found in the *Journal*, vol. xvii, 526 (C. E. C. Fischer).

In the Nelliampathies it is common in fine weather, coming up from the plains (Kinloch). Fairbank found it common on the tanks and ponds near the base of the Palnis and in these hills he observed it up to 4,000 ft. while Terry observed a pair at Kodaikanal, where they usually hawked about the lake.

In Travancore it is common all over the low country, preferring the neighbourhood of the sea and the palmyra plantations some miles inland. Here too it occasionally visits the hills in the hot weather.

Nothing appears to have been recorded about the breeding season of the Brahminy Kite in the Presidency except in Travancore where it is said to breed in January and February.

Milvus migrans govinda Sykes.

Milvus govinda Sykes, P.Z.S. 1832 (31 July 1832), p. 81—Dukhun.

Specimens collected:—264 ♀ 21-5-29 Shevaroy Hills 4,800 ft.; 325 ♀ 3-6-29 Chitteri range 2,000 ft.; 606 ♂ 15-8-29 Palkonda Hills 1,000 ft.; 1741 ♀ 29-4-1930 Jeypore Agency 3,000 ft.

Measurements:—

| | Bill. | Wing. | Central tail. | Outer tail. |
|----------|---------|---------|---------------|-------------|
| 1 ♂ imm. | 35.5 | 426 | 213 | 246 mm. |
| 2 ♀ ad. | 37-38.5 | 418-437 | 217-227 | 244-269 mm. |
| 1 ♀ imm. | 39 | 413 | 213 | 242.5 mm. |

The Common Pariah Kite seems to be very generally distributed and numerous throughout the Presidency though there are few details available from the eastern side. The Survey specimens and two birds in the British Museum collected north of Ellore by Blanford are supplemented by Dewar's statement that it is found in great numbers at Madras. Here as at other parts it is found about the harbour. William Davison saw one accompany a ship the whole way from Madras to Calcutta (*S.F.*, ii, 150), and H. B.

Tilden (*J.B.N.H.S.*, xxxi, 526) saw one strike a wavelet in the harbour and after flopping about in the water for half an hour sink and drown.

On the western side the kite is apparently more of a local migrant. In Coorg according to Betts it occurs round most villages but not in great numbers and it disappears at the end of the hot weather, not apparently breeding in the district. There is no information about it in the Wynaad but in the Nilgiris it keeps mostly to the neighbourhood of the stations and villages, and is less numerous on the estates though found at all elevations. It is common from December to the beginning of the rains in June, but very few are to be seen during the South-West Monsoon.

Fischer remarks (*J.B.N.H.S.*, xvii, 526) on kites collecting to a termite hatch at Geddesal, Coimbatore, and he also remarks on the way they collect in Kollegal Taluk to eat dead silk-worms thrown out by the villagers.

In the Palnis the kite is common round the base of the hills but scarce over about 3,000 ft. It is common in fine weather in the Nelliampathies, but Kinloch believes it is only a daily visitor from the plains, not roosting in the hills.

In Travancore the bird is abundant in the low country and though common also in the hills is apparently only found up there in the hot weather, also possibly only as a daily visitor.

Ferguson gives the breeding season in Travancore as February and March. William Davison says that in the Nilgiris it is in December, January and February and at Madras he took the nest at the latter end of December.

In the pages of *Stray Feathers* (i, 160; iii, 35, 229-30, 275; iv, 272; viii, 180, 466; ix, 309; x, 181) there was a good deal of discussion as to whether the *Milvus govinda* of Sykes was the larger or the smaller of the two Peninsula forms. Brooks held that it was the larger bird *lineatus* whilst Hume maintained that it was the ordinary smaller bird since known by the name. There can be no doubt that Hume was correct and the type now in the British Museum, if correctly so designated, supports his view, being an ordinary adult bird (bill, 37; wing, 438; tail, 264 mm.). The further controversy as to whether there are two or three forms in India—in addition to *Milvus migrans migrans* since shown to breed in Baluchistan—was justified. The kite, like many other species, increases slightly in size in India from south to north, and the difference will be seen if these Survey specimens are compared with the following Punjab series in my collection:—

| | Bill. | Wing. | Central tail. | Outer tail. |
|-----------|---------|---------|---------------|-------------|
| 5 ♂ adult | 38-40.5 | 435-471 | 221-247 | 266-310 mm. |
| 1 ♂ imm. | 38.5 | 453 | 224 | 266 mm. |
| 3 ♀ adult | 39-40.5 | 463-470 | 246-256 | 281-301 mm. |
| 1 ♀ imm. | 40.5 | 466 | 237 | 274.5 mm. |

The South Indian series is, however, so small, and the number of intermediate birds so great that the recognition of two races in the Peninsula—in addition to the large Himalayan form *lineatus*—does not at present appear of value.

***Elanus caeruleus vociferus* (Latham).**

Falco vociferus Latham, *Index. Orn.*, vol. i (1790), p. 46—Coromandel Coast.

Not reported by the Survey. There is very little information about the status of the Black-winged Kite in the Presidency. On the eastern side all we know about it is furnished by the specimen in the Madras Museum from Kolambakkam, Chingleput District, and by Theobald's account (*Scrapbook*, p. 305) of the breeding of Montagu's Harrier in Salem district. This nest contained three feathered young on Christmas day and the description leaves no doubt in my mind that the nest really belonged to the Black-winged Kite.

On the west the bird is better known. Primrose states (*J.B.N.H.S.*, xvi, 165) that he saw a pair hawking at Poda Padi at the foot of the South Wynaad Hills and specimens from the Wynaad (♀ 5-12-1877, Darling) and Sultan's Battery (♀ 19-2-1883, William Davison) are in the British Museum. Davison speaks of it as rare, saying that he had shot one some years previously at Neddivatam and that his shikari had got another below Kotagherry, the bird having been seen by him on perhaps half a dozen occasions in all.

Kinloch considered it somewhat rare in the Nelliampathies, only occasionally appearing as a visitor for a day from the plains.

Ferguson had only two records for Travancore. One was shot in Trivandrum and another seen in open grass land at Sastancotta in the low country near Quilon, both occasions being in March.

Circus macrourus (S. G. Gmelin).

Accipiter macrourus S. G. Gmelin, Nov. Comm. Acad. Petropol., vol. xv (1771), p. 439, pl. viii and ix—Voronezh to River Don, Russia.

Not obtained by the Survey. The Pale Harrier is a common winter visitor to the greater part of the Presidency, though as usual there are not many records from the eastern side.

In the Jeypore Hills, Vizagapatam, Donald met with a number collecting to roost with Marsh and Pied Harriers on a bare plateau on 13 February (*J.B.N.H.S.*, xvi, 504). Dewar was doubtful whether the species could be included in his Madras list but there is a specimen from Singaperumal Coil, Chingleput, in the Madras Museum and Major Bates informs me that Harriers, presumably of this species, were common at St. Thomas' Mount. There he first noted them in 1929 on October 16th and in 1924 on October 18th, and in 1930 they were common up till April 21st. A Harrier of some sort was seen on the grass farms on June 3rd and again about a mile up the Adyar River from the grass farm on June 13th.

In Coorg Betts gives the date of arrival as 4 November (1928) (*J.B.N.H.S.*, xxxiii, 718). A specimen collected in the Wynaad on 1 January 1878 by Darling is in the British Museum. In the Nilgiris William Davison considered it a very abundant winter visitor coming in about the end of October (first noted 29 October 1929 Betts, *J.B.N.H.S.*, xxxiv, 569) and seen as late as the last week in April. Primrose, however, points out (*J.B.N.H.S.*, xvi, 165) that they are usually not common above 5,000 ft.

In Travancore the Pale Harrier is not uncommon from November to February. It is found both in the low country and in exposed grass land on the High Range at 6,000 ft. There are specimens from both the Nilgiris and Travancore in the British Museum.

Circus pygargus Linnaeus.

Circus pygargus Linn., Syst. Nat., ed. x, vol. i (1758), p. 89—England.

Montagu's Harrier is doubtless a regular winter visitor to the Presidency and Hume remarks (*Scrapbook*, p. 306) that the Nilgiris provide one of the areas of its greatest abundance in India, though William Davison curiously enough does not include it in his list.

In Travancore, according to Ferguson, it arrives about December and is found both in the hills and plains. An adult male collected by Bourdillon at Eridge on 28 December 1877 is in the British Museum.

In Salem District Hume's collector, Theobald, stated that Montagu's Harrier was common from December until May or June and this identification was supported by specimens of which an adult male, collected on 18 January 1869, is in the British Museum. His account of the breeding in that district (*Scrapbook*, p. 305) was, however, evidently due to confusion with *Elaeus cinereus*.

The bird is included without comment by Dewar in his Madras list. It was not obtained by the Survey.

Circus melanoleucos (Pennant).

Falco melanoleucos Pennant, Ind. Zool. (1769), p. 2, pl. ii—Ceylon.

The Pied Harrier was not obtained or recorded by the Survey, but it is evidently a regular winter visitor and passage migrant (on its way to Ceylon) in the Presidency. Donald met with a few roosting with numbers of Marsh and Pale Harriers in the Jeypore Hills on 13 February (*J.B.N.H.S.*, xvi, 504). Dewar includes the species in his Madras list and a specimen from Chingleput is in the Madras Museum. Of three adult males in the

British Museum marked 'Madras' one at least apparently came from the neighbourhood of the capital.

On the west the Pied Harrier occurs but sparingly in the Wynad and on the Nilgiris and their slopes according to William Davison, and Primrose (*J.B.N.H.S.*, xvi, 165) mentions seeing a few on the Terramia Tea Estate.

In Travancore, according to Ferguson, it is less common than the other species, frequenting the low country as well as the hills. A female collected by Bourdillon on 18 April 1877 in the Colathoorpolay Patnas 3,800 ft. is in the British Museum. In Travancore it may be seen as late as the beginning of April.

Circus aeruginosus aeruginosus (Linnaeus).

Falco aeruginosus Linnaeus, *Syst. Nat.*, ed. x, vol. i (1758), p. 91—Sweden.

Not procured by the Survey. On the eastern side the Marsh Harrier is only recorded from the Jeypore Hills, Vizagapatam, where Donald found it the most numerous species in the congregation of Harriers at a roost on a bare plateau on 13 February (*J.B.N.H.S.*, xvi, 504).

On the west it is a fairly common winter visitor. Betts' date of first arrival in 1932 in Coorg, namely September 26 (*J.B.N.H.S.*, xxxvii, 225) and William Davison's specimen in the British Museum, collected in the Brahmagherries on 16 April 1881, suggest the normal duration of its stay in the Presidency.

William Davison says that the Marsh Harrier is not uncommon on the Nilgiris and their slopes. Primrose records a bird at a small swamp in the Terramia Tea garden (*J.B.N.H.S.*, xvi, 165), and a male collected at Kotagiri (Cockburn) on 28 January 1875 is in the British Museum.

In Travancore, according to Ferguson, this is the commonest Harrier, found about paddy fields in the low country from October to April. It does not, however, ascend the hills.

Buteo buteo burmanicus Hume.

Buteo burmanicus Hume, *Stray Feathers*, vol. iii (1875), p. 30—Thayetmyo, Upper Pegu.

No specimen of a Buzzard was secured by the Survey, and the genus does not yet appear to have been recorded from the eastern side of the Presidency.

On the western side there are several records and one species appears to be a not uncommon winter visitor to the hill ranges. No two authors agree as to the identification or the nomenclature of the forms of Buzzard which are resident in or winter visitors to India, and I despair of ever being able to settle these oft-debated questions. There seems, however, to be little doubt that the Buzzards which visit South-West India in winter all belong to the smaller form which has been treated variously as *Buteo vulgaris*, *B. desertorum*, *B. plumipes*, *B. japonicus* or, as in the *New Fauna*, *Buteo buteo burmanicus*.

A male was shot by William Davison on 16 April 1881 in the Brahmagherries. This was described by Hume as *B. desertorum* in *Stray Feathers* (x, 159 and 338) after submission to Gurney.

Jerdon had previously shot a specimen in the Nilgiris and seen one or two others (*B. of I.*, i, p. 88). These he called *Buteo vulgaris* or *Buteo rufiventris*. William Davison also saw Buzzards on several occasions in the Nilgiris and on the strength of a specimen in the dark fuliginous plumage seen at Ootacamund attributed them to the name *Buteo plumipes*. This was also the name given by Hume to a specimen received by him from Bourdillon in Travancore (*S.P.*, iv, p. 358). Bourdillon called it a not uncommon winter visitor in December, January and February preferring high open country at 2,000 ft. and higher. Ferguson later added—under the name *desertorum*—that he had often seen them over the grassland at Ponnudi, without however obtaining a specimen.

It is stated in the *Old Fauna* (iii, 389) that the genus *Buteo* is remarkable amongst its near relatives in having no distinct immature plumage and this statement is very generally accepted as correct, and is agreed to in the *New Fauna* (v, 136). It seems curious therefore that on the next page Mr. Stuart

Baker has given separate keys to the adult and immature plumages, a procedure adopted in no other genus of the Falconidae.

Astur badius dussumieri Temminck and Lang.

Falco dussumieri Temminck and Lang., Planch. Color. d'Ois (November 1824), livr. 52, pl. 308—Bengal, India.

Specimens collected:—452A ♀ 20-6-29 Tirthamalai 1,000 ft.; 794 ♂ 4-9-29, 828 ♀ 18-9-29 Kodur 500 ft.; 861 [♂] 1-10-29, 915 [♀] 13-10-29 Seschachalam Hills 2,000 ft.

Measurements¹:—

| | Bill. | Wing. | Tail. | Tarsus. |
|-----|-----------|---------|-----------|-------------|
| 2 ♂ | 19.5-20 | 176-178 | 137.5-141 | 47.5-48 mm. |
| 3 ♀ | 22.5-23.5 | 204-208 | 156-163 | 48-54.5 mm. |

Unless Jerdon's statement that the Shikra is very common through the whole of India is held to cover the eastern side of the Presidency we have no record of this species in that area beyond Gooty (*Nidification*, iv, 104), the Survey specimens and Dewar's inclusion of the name without comment in his Madras list. On the west there is more information. In Coorg it is widely spread but not common according to Betts. In the Wynad it is common according to Primrose (*J.B.N.H.S.*, xvi, 165) and William Davison and thence it extends commonly up the slopes of the Nilgiris as far as the plateau, where however it is only sparsely distributed.

Kinloch says that the Shikra is common in the Nelliampathies. In Travancore Ferguson says it is a very common resident in the low country and at the foot of the hills. It ascends the hills occasionally but only where there is open land.

Bourdillon gives the breeding season in the Travancore plains from March to June. Stuart Baker (*New Fauna*, v, 148) says that Bourdillon and Stewart took eggs in February, March and May and in *Nidification* (iv, 102) on their authority he gives the breeding season as from the middle of January to the middle of April.

In the Nelliampathies Kinloch took eggs on 27th March and Howard Campbell took his eggs at Gooty on 22 February (*loc. cit.*).

The races of the Shikra are very difficult to define. It is clear that—speaking in general terms—a very small and dark race in Ceylon grades gradually into a large pale race in Turkestan but the degree and the gradation of these differences is so slight and their average is so obscured by individual variation that it is very difficult to know where to draw a line of demarcation between the different races.

As in any study of this species the sexes and the ages must be considered separately, it is necessary to point out that the *New Fauna* (v, 148) is wrong in saying that the adult female is like the adult male. The adult male Shikra has the entire upper plumage an ashy blue-grey with the central tail feathers unbarred, indeed unmarked save for in some cases an obsolescent spotting along the shafts, indicating the position of the vanished bars. The adult female, on the other hand, has the upper plumage dark smoky brown, washed with grey while the central tail feathers have rather more trace of barring extending also to their webs. This distinction is maintained in all adults that I have seen and the difference in size between the sexes is also very constant.

If Ceylon birds (*badius*) are compared with birds from Bengal (*dussumieri*) it will be found that in the adult male and female there is no constant difference in colour. Odd males from Ceylon and Southern India are darker above and similarly odd males from North-West India are paler and brighter. Some females from Ceylon and Southern India have the barring on the lower plumage darker and browner, but these differences are purely individual and probably do not affect 50 per cent of a series, so alone cannot be regarded as subspecific. The immature male and female in Ceylon are, however, very distinct, a very rich dark brown with bright rufous edging on the upper

¹ Adult and immature birds of the same sex do not appear to differ in size.

parts, contrasting definitely with the grey washed tail. The shaft streakings on the lower plumage are a very rich dark chocolate brown in colour. Immature birds from the continent are alike, whether in the North-West, Bengal, or further South. The upper parts are paler with pale fulvous edging and a grey wash so that there is little contrast with the upper surface of the tail. The streaks on the lower plumage are much paler, a more rufous brown. This character of the juvenile plumage in Ceylon justifies separation of the island race. It also is rather smaller:—

| | Wing. | Tail. |
|------------------|-----------|---------------|
| 6 ♂ adult Ceylon | 177.5-182 | 129.5-132 mm. |
| 6 ♀ adult Ceylon | 195-202 | 147-158 mm. |

The large race *cenchroides* I have difficulty in defining for lack of material from Russian territories. Both the adult male and female are much paler above and the barring of the lower parts is also very pale. The immature bird is similar to that of *dussumieri* but is perhaps a little paler above, though single birds could not be separated with certainty. I measure specimens from Bokhara, Kandahar and Quetta as follows:—

| | Wing. | Tail. |
|---------|---------|-------------|
| 3 ad. ♂ | 196-198 | 148-154 mm. |
| 4 ad. ♀ | 214-233 | 174-180 mm. |

Hartert gives the measurements as follows:—

| | Wing. | Tail. |
|-----|---------|-------------|
| 9 ♂ | 185-197 | 150-160 mm. |
| 6 ♀ | 210-222 | 180-192 mm. |

Between these two the intergrading is so complete and so gradual that no definite racial boundaries can be fixed and as a matter of practical convenience it is best to group all birds from India proper—including the Himalayas—as *dussumieri* recognising that the proportion of dark birds will be higher in extreme Southern India and the proportion of pale birds higher in N.-W. India as they approach the boundaries of the two extreme races. It is a matter of opinion whether Travancore birds should go with *badius* or *dussumieri*. Some adults are very dark. The only immature bird I have seen, on the other hand, agrees with *dussumieri*. Measurements overlap, but on the whole I am inclined to keep Travancore birds as *badius*.

Astur trivirgatus trivirgatus (Temm. and Lang.).

Falco trivirgatus Temm. and Lang., Planch. Color. d'Ois. (Octobre 1821), livr. 51, pl. 303—Sumatra.

The Crested Goshawk is known to occur along the western side of India from N. Kanara (not Khandesh as given in the *New Fauna*, v, 154 and *Nidification*, iv, 107, though on p. 108 it is given correctly) down to Travancore and again in Ceylon. It is of course resident.

In the Presidency Primrose says that he saw a few—though he did not consider it common—in the Wynaad (*J.B.N.H.S.*, xvi, 165). Jerdon did not consider it very rare in the Nilgiris but this statement is rather objected to by William Davison who states that whereas in the Nilgiris one may obtain two or three specimens in three or four months' hard collecting, he had seen five in a single morning in the Wynaad, between Nellacotta and Davala. It certainly keeps to the wilder parts of the Nilgiris and being a very silent bird may easily be overlooked. Kinloch calls it common in the Nelliampathies and his identification is confirmed by a specimen sent me, collected in December 1923.

In Travancore it is said to be by no means common, keeping mostly to the forest-clad hills and breeding at about 1,500-2,000 ft. (Bourdillon). Stewart, however, says that it breeds from the foothills up to some 3,000-3,500 ft.

Eggs have been taken in Travancore from 2nd March to 25 May (Stewart) but the latter date is considered unusually late.

There are only two specimens of the Crested Goshawk from Sumatra in the British Museum but they support the usually accepted statement that birds from S.-W. India agree with the typical race. It is perhaps unfortunate, however, that in *Nidification*, vol. iv, p. 107, Mr. Stuart Baker has selected this species as the most complete example of the affinity between birds from S. India and Ceylon and those of the Malay Peninsula, for it is quite impossible to keep S. Indian and Cinghalese birds under the same subspecific name.

Cinghalese birds differ from those of S.-W. India in the much deeper, more chocolate brown of the markings on the breast, flanks and upper abdomen in the adult. These markings are smaller in extent and pear-shaped in character so that the breast gives an impression of white, spotted with dark brown. In the continental birds, on the other hand the impression is more of a brown breast, with the feathers edged with white. The island form is also smaller.

| | Bill. | Wing. | Tail. |
|------------------------|-----------|---------|-------------|
| 2 adult ♂ Ceylon | 24-25 | 183-184 | 150-152 mm. |
| 4 adult ♀ Ceylon | 27-27.5 | 199-206 | 157-168 mm. |
| 6 adult ♂ S.-W. India | 26-28 | 196-208 | 159-168 mm. |
| 6 adult ♀ S.-W. India. | 28.5-30.5 | 214-237 | 169-180 mm. |

This insular form is clearly worth recognition and as no existing name refers to it I propose to call it

ASTUR TRIVIRGATUS LAYARDI subsp. nov.

Type:—♀ ad. Pilymally, Peak Forest, 15 August 1876 (Legge). British Museum Register No. 1878—10.4.23.

***Astur trivirgatus indicus* Hodgson.**

Astur indicus Hodgson, Bengal Sporting Magazine, vol. viii (October 1836), p. 177—Nepal.

Specimen collected:—1740 [♂] 28-4-1930 Anantagiri 3,000 ft.

Measurements:—

| Bill. | Wing. | Tail. |
|-------|-------|---------|
| 28 | 220 | 168 mm. |

This fine adult male of the Crested Goshawk must from its measurements clearly be attributed to the Himalayan race, though as one would expect, it is slightly small for it and therefore intermediate in character. This provides the only record for the outlying corner of the Presidency though Jerdon says it is found in the Eastern Ghats and it is known to occur in Nagpur, Balaghat, Sambalpur, Singbhum and Manbhum. Birds from this latter area have already been attributed by Hume (*S.F.*, v, p. 8) to the Himalayan race.

***Accipiter nisus nisosimilis* (Tickell).**

Falco nisosimilis Tickell, J.A.S.B., vol. ii (December 1833), p. 571—Marcha in Borabhum.

In spite of Jerdon's statement that the Sparrow Hawk is abundant on the Eastern Ghats, many being caught every year, it was not procured by the Survey and I have seen no specimens from this side of the Presidency. Dewar includes the bird without comment in his list, probably on the strength of the Red Hills specimen said to be in the Madras Museum.

On the eastern side the Sparrow Hawk seems to be a fairly regular winter visitor, though it is at present only recorded from the Nilgiris and Travancore Hills. In the former William Davison says that it occurs sparingly and he mentions an adult female collected by himself at Ootacamund on 7 February 1881, which is still in the British Museum. Immature females collected at Kotagherry on 25-11-74 and 11-12-74 by Miss Cockburn are also in the British

Museum. My own collection contains adult males collected at Ootacamund on 19-1-02 by Col. H. R. Baker and 13-2-1935 by Major E. G. Phythian-Adams.

An immature female collected by Bourdillon at Mynall in the hills in winter (*S.F.*, vii, 33 and *J.B.N.H.S.*, xv, 672) and an immature male collected by Fry in Travancore are also in the British Museum.

The above specimens all belong, in my opinion, to the large pale form to which Tickell's name is applied. Tickell's type is not in existence, so far as is known, and his description of an immature male, though detailed and good of its kind, is not sufficient to allow of racial discrimination. The name has however been applied to the Asiatic breeding form on grounds given by Hartert (*Vog. Pal. Fauna*, ii, p. 1155) and this attribution is satisfactory and may well stand.

I may here note that it is evident from the fine series in the British Museum that this form is the breeding bird of the Gilgit area, so the statement in *Nidification*, vol. iv, p. 110, that *melanoschistos* is the only race breeding in the limits of the Indian Empire is incorrect.

Accipiter virgatus besra Jerdon.

Accipiter besra Jerdon, Madras Jour. Lit. Sci., vol. x (1839), p. 84—Soonda Jungles.

The Besra was not procured by the Survey and there is very little recorded about its distribution in the Presidency. On the eastern side all I can find out about it is the existence of a local specimen in the Madras Museum and Jerdon's statement that it is found here and there in the Eastern Ghats. His Indian informants also told him that it was found occasionally in the tract of jungly country in South Arcot and Chingleput, bordering on Tanjore and Trichinopoly.

In the Nilgiris William Davison considered it rare. He obtained a couple of specimens (one of which is in the British Museum:—♂ adult 18-11-1881) and saw others on the Coonoor Ghat; an immature female collected at Kotagerry by Miss Cockburn on 16 June 1874 is also in the British Museum.

Kinloch says that it is very common in the Nelliampathies and Stuart Baker, on the authority of Stewart, says that it is common in Travancore. Here the breeding season is said to last from January to May, most eggs being laid in March and April (*Nidification*, iv, p. 112). The bird is doubtless a resident in our area.

The *New Fauna* admits only two races of Besra in India namely *A. v. besra* in Southern India and Ceylon and *A. v. affinis* across the whole of Northern India and the Himalayas.

There are, however, in my opinion three races, as Himalayan birds fall into the usual eastern and western races. Of these the eastern birds agree with *Accipiter affinis* Hodgson, *Bengal Sporting Mag.*, new series, vol. viii (1836), p. 179—Nepal. Western birds differ from them as follows:—

(1) Adult ♂. The upper parts are definitely paler with more of a dove-grey tint as opposed to sooty grey. The underparts are also slightly paler and I have seen no specimens of the type which has the underparts very like those of the adult female, a type that is common in the eastern form.

(2) Immature ♂. The upper parts are markedly paler, both as regards the brown colour of the feathers, the rufous edges to them and the pale area of the hindneck, which last is white as opposed to rich rufous. The lower parts are much paler, lacking the rich rufous wash on the throat and breast found on eastern birds.

Females, adult and immature, cannot individually be separated, but in a series western birds are slightly paler.

The birds which appear in winter in the United Provinces belong to this western form. As there does not appear to be any existing name applicable I propose to call it

ACCIPITER VIRGATUS KASHMIRENSIS Subsp. nov.

Type:—♂ ad. 14 September 1868 Murree (Coll. C. H. T. Marshall), British Museum Collection Register No. 1885.8.19.641.

Measurements:—

| | | Bill. | Wing. | Tail. | Tarsus. |
|----------------------------|---------|---------|-----------|-----------|---------|
| <i>A. v. kashmiriensis</i> | 5 ad. ♂ | 18 | 165-167 | 127.5-130 | 49.5-53 |
| | 5 ad. ♀ | 21.5-23 | 196-207 | 153-160 | 55-58.5 |
| | 6 ad. ♂ | 18-20 | 165-173.5 | 123-135.5 | 48.5-53 |
| <i>A. v. affinis</i> | 5 ad. ♀ | 22-24 | 199-210 | 161-167 | 54.5-61 |

Accipiter virgatus besra of S. India and Ceylon is a much smaller bird as is shown by the following measurements:—

| | Bill. | Wing. | Tail. | Tarsus. |
|----------|---------|---------|-----------|-------------|
| 4 ad. ♂ | 17-18 | 148-155 | 112-119.5 | 45.5-48 mm. |
| 4 imm. ♀ | 21-22.5 | 178-187 | 137-148 | 52-55 mm. |

It is, therefore, of the same size as the typical form (Java) but the latter is far more richly coloured.

***Pernis ptilorhynchus ruficollis* Lesson.**

Pernis ruficollis Lesson, *Traité d'Orn.* (February 1830), p. 77—(patrie inconnue) Bengal.

Not procured by the Survey. The only record of the Crested Honey Buzzard on the eastern side of the Presidency which I can find is furnished by two specimens in the Madras Museum from Madras and Kodambakkam, as Dr. Gravely kindly informs me.

On the west William Davison says that the Honey Buzzard occurs throughout the Wynaad and a female collected by him at Manantoddy on 5 April 1881 is in the British Museum. It also occurs on the lower slopes of the Nilgiris where Primrose says (*J.B.N.H.S.*, xvi, p. 166) that he collected two specimens and saw a few others. A specimen from Kotagiri is in the British Museum.

In Travancore Ferguson secured a specimen at Pirmaid near the Periyar dam in January 1901.

Nothing accurate is known about the status of the Crested Honey Buzzard in the Presidency and there is little warrant for the statement in *Nidification* (iv, 116) that the bird is resident in Ceylon. Legge was clearly of opinion that it was an immigrant and did not breed in the island.

***Baza leuphotes leuphotes* (Dumont).**

Falco leuphotes Dumont, *Dict. Sci. Nat.*, xvi (1820), p. 217—Pondicherry.

Very little is known about the Black-crested Baza in the Presidency and it appears to be a very rare bird. The Survey did not meet with it. On the eastern side Jerdon informs us that he shot a specimen in a grove at Davropilly in Nellore district. There is a specimen in the Madras Museum labelled Madras. The type specimen came from Pondicherry and there is a male in the Hume collection from Trichinopoly dated 1871. There is unfortunately nothing to show the month of any of the specimens but they were usually considered as supporting the hypothesis expressed by Legge that the Black-crested Baza was migratory, the birds which visited Ceylon in the cold weather probably having bred in the Eastern Himalayas.

On the western side this Baza is only recorded from Travancore and Stewart appears to have been the only observer to meet with it in that State. A specimen collected by him on 19 February 1914 in the Aneichardi Estate is in the British Museum. According to the *New Fauna* (vol. v, p. 172 and *Nidification*, iv, 121) the breeding season in Travancore is in February, March and April and Stewart took a nest of eggs on 4 July. If this is correct the bird can hardly be a migrant but Stewart obtained most of his eggs from native collectors and there may have been some mistake in the matter.

The statement (*loc. cit.*) that the young bird is unknown is incorrect. It was described by Bingham (*S.F.*, ix, 145) and it remains to be seen whether the differences attributed to the Burmese race *B. l. burmana* Selater are not merely those of immaturity.

Baza jerdoni ceylonensis Legge.

Baza ceylonensis Legge, *Stray Feathers*, vol. iv (1876), p. 247—Kandy, Ceylon.

For many years Legge's Baza could only be included in the fauna of the Presidency on the strength of a single specimen, the immature male collected in the Wynaad on 17 October 1877 by Darling and fully described by Hume in *Stray Feathers*, vii, p. 151, and reported on by Gurney (*S.F.*, viii, p. 445). Since then it has been discovered in Travancore by Stewart who says that it is rare and difficult to locate (*New Fauna*, v, 176 and *Nidification*, iv, p. 123). The breeding season in Travancore is given as from early February to the end of April, most eggs being laid in March. There appears to be no doubt that it is resident.

(To be continued).

TO MALAYA FOR A RHINOCEROS.

BY

R. C. MORRIS, F.Z.S.

(With 2 plates).

Sanction having been obtained by Mr. Arthur S. Vernay from the Government of Perak, F.M.S., through Mr. Hubback, the Game Warden of Malaya, to collect a bull *Rhinoceros sondaicus* for the American Museum of Natural History, I was asked early in 1935 to undertake the expedition with the assistance of Mr. H. C. Raven of the American Museum and Professor of Comparative Anatomy at the University of Columbia. Raven preceded me to Malaya by a fortnight with the idea of making all necessary arrangements on the spot, but he found the Game Warden away on tour and was unable to effect as much as he would have liked to. However, I do not think that this at all affected the final results.

Sailing from Madras on the s.s. *Rajula* on the 21st May I discovered that I could have joined the boat five days later at Negapatam! The Straits steamer from Madras meanders down the east coast picking up and discharging cargo at the ports of Pondicherry, Cuddalore, Porto Nuovo, Karikal and Negapatam. However this enabled me to land at and see Pondicherry and Karikal, both French ports, and unromantic places they are. Pondicherry especially gives the landing visitor the impression of being 'unfinished' with the Place de Dupleix surrounded by tall unconnected pillars (apparently taken from some ancient temple) and the work on the statue of Dupleix never completed. Four iron stanchions, supports for a canopy over the statue, stand out in ugly contrast and spoil the beauty of the work. Here one sees those curious vehicles, the *push-push* carts, the only specimens of its kind in the world; built on the model of a Victoria horse-drawn carriage, of the size of a rickshaw but with four wheels and pushed from behind like a bath chair, the racketsy-packety *push-push* cart is a comic spectacle. The coolies and boatmen that throng round the visitor on his arrival on the jetty insisting that his presence is required by the Commissioner of Police, the Collector of Customs or, if the names of these two officials make no impression, the Postmaster (!!), the idea being to extort bakshish as guides, are an intolerable nuisance. Karikal is said to flourish on smuggling. I landed at Negapatam to see a friend and found it uncomfortably hot and mighty unclean. Negapatam had to my mind the appearance of a dying port which had once seen far better days.

Sailing from Negapatam on the 26th we arrived at Penang at dawn on the 30th. The crossing was uneventful, the southern islands of the Nicobars were passed on the 28th and the northern end of Sumatra the following day. I was fortunate in having the Director of Irrigation and Drainage in Malaya and the

Director of Immigration with me on board, both very pleasant companions, and the former was especially helpful in giving me a letter of introduction to his superintendent in charge of Irrigation at Teloh Anson in Perak, F.M.S. On my arrival at Penang I was met by Mr. Coulson, the Government Treasurer, and received from him the greatest help. It is perhaps not generally known that both Penang and Singapore are islands and form, together with Malacca, the three Straits Settlements of Malaya. Malacca is itself a part of the Malay Peninsula, which also comprises the nine Native States of Perak, Pahang, Selangor, Negri Sembilan, Johore, Kedah, Perlis, Kelantan and Trengganu, the first four of which are federated and the remaining five unfederated. Penang is quite rightly called the most beautiful town of the East: the whole setting is truly gorgeous and the range of hills rising to 2,000 ft. on the eastern side, to the top of which runs a funicular railway from the town of Penang, forms a superb background to a beautiful scene. Very attractive are the Chinese girls in their gaily coloured 'pyjamas'-like clothes (surely these must have given rise to the modern Western beach-pyjamas). Late in the afternoon I boarded the Straits steamer, the s.s. *Krian*, arriving at Teloh Anson, on the mighty Perak river, at 7 a.m. on the following morning. Here I was met by the Superintendent of Customs who very kindly saw my things through and found R awaiting my arrival at the Rest House. The day was spent in fixing up the hire of a launch from the Superintendent of Irrigation, taking out Arms Licenses, seeing the District Officer, Mr. de Moubray, and in making final purchases. Mr. and Mrs. de Moubray were most kind and helpful to us. R had paid a visit to Mr. Hubback's headquarters at Kuala Lipis, Pahang, and had brought back with him four Pahang Malays as camp coolies. I was fortunate in that R could speak Malay, having picked it up some years ago while collecting in the Dutch East Indies, and it speaks well for R's memory that he had forgotten little. Malay is undoubtedly one of the easiest languages in the world to learn, it is indeed absurdly easy to pick up. It struck me as amusing that a Malay cooly could spell a Malay word in English without knowing a word of English! Although Malaya has a script of its own their language is now mostly learnt by the Malays themselves in Roman characters and the use of the Malay script is fast dying out. I found the Malays, nearly all are Mohamedans, a pleasant and cheery crowd, though notoriously lazy. Living in a wonderfully fertile and rich country the Malay has never had to work hard for his living.

June 1st saw us leave Teloh Anson and work up the Perak river, finally turning off up the river Kinta, a large tributary of the Perak, arriving at our first camp, Changkat Budiman, late in the afternoon. Here we camped in a hut in a patch of rubber owned by some Indians. Mosquitoes were bad but luckily R had included in our outfit mosquito nets for our party. Some of the eggs we had purchased in Teloh Anson were not too good and Mahmet, our excellent servant, informed us that he had found

'little fowls' inside several of them! Leaving camp early next morning with Ngah, the Game Ranger, kindly lent to us by Mr. Hubback, and four Sakais (aborigines of Malaya) I trekked northwards marching by compass, across the Kroh Reserve and had my first experience of the Malayan jungles. The going was extremely bad at times, swamp after swamp had to be crossed either knee, waist or, in one case, shoulder deep. Old tracks of elephants and fresh tracks of pig and tapir were seen but no sign of any rhino. Ngah, a nice old rogue, knew only a few words of English and described one track to me as that of a 'ham'. It took me quite a minute to realise that he meant pig. Very easy it must be to get lost in the dense and vast evergreen jungles of Malaya and a compass is most essential. Langurs of two types were seen, *Pithecus cristatus* and *P. obscurus*. The white-handed gibbon (*Hylobates lar*) and seermangs (*Symphalangus syndactylus*) were either seen or heard, as also the common tailed-macaque (*Macacus mandibularis*). The seermang is outwardly very similar to a gibbon and was formerly, in fact, classed among the *Hylobates*. Several hours of tiring struggle through swampy areas brought us to the Sakai villages at Pinggan and further on to a Chinese Rubber Plantation and shop on the Kinta river. R turned up an hour later in the motor launch. Returning with him to the Sakai villages we discussed with them the prospects of finding a *Rhinoceros sondaicus* and a reward was offered. The Sakais were anything but optimistic. No tracks of *sondaicus* had been seen, we were informed, for a long time. On our way back to the river we were drenched to the skin in a torrential thunder-storm. Heavy rain fell almost daily although June is supposed to be one of the dry months. That night we occupied a Malay's new unfurnished house, the Atap or Nipa palm roof of which was effectively rainproof.

Leaving early next morning by boat we landed and searched one of the few areas bordering the Kinta river which was not under flood water. There were no signs of any rhino tracks, of tapir a few. Proceeding in our launch further down we camped that night at Kampong Laba Kubong. From here I marched through a part of the forest bordering the Kinta with the idea of meeting R further up river. Water got into my compass and it was not functioning properly with the result that I found myself travelling in the wrong direction. Leading our way back we struggled through swamps and dwarf screw-pine, to traverse which we sometimes had to fell and walk along saplings, and eventually found ourselves on the bank of the Kinta again just as light was failing. On the opposite bank luckily was a fisherman's hut, and the owner obligingly took me upstream in his small sampan until I met R. On our way downstream again we picked up my men and camped for the night at Laba Kubong. In the morning, after collecting two or three squirrels in a rubber plantation surrounding the village, we proceeded downriver and turning up the river Kroh camped at some fishermen's huts about 2 miles up. I noticed every time I raised my shot gun to my shoulder a pleasant smell, the source of which puzzled me con-

siderably until I found my gun had been cleaned with our skinner's 'Brilliantine'! Leaving R here I paddled up the Lampam river, a tributary of the river Kroh, in a sampan with four Sakais. Landing about 3 miles up we followed a path and then searched for rhino tracks all over that area. Fresh tracks of tapir were seen and old tracks of elephant, but none of rhino. The ground was mostly dry though three or four deep swamps were encountered. The leeches were bad here, although under similar conditions in other parts of the jungle we found none. On June 5th we again worked up the Lampam river with six Sakais and four Malays as porters and camped that night in one of the Elephant Control Patrol huts on a forest reserve boundary. Here we found the jungle had been quartered by lines cut through the forest prior to being felled for paddy cultivation. The Sakais made a fire with a modern petrol cigar lighter! I was also amused at seeing a message written in pencil on a tree blaze from one Game Ranger to another to the effect that food had been left for him in one of the Patrol Huts: *Barang-makantingal*, literally ('things to eat remain'). Leaving camp early we returned to the Lampam river and boated down in sampans to the launch at the fishermen's huts. Here the Sakais were paid off as we had satisfied ourselves that rhino were not to be found in the Kroh Reserve. Two or three more squirrels were collected. Travelling down the Kroh and Perak rivers we reached Teloh Anson by noon. In the afternoon Mr. Theodore Hubback with Mr. Plane, the Elephant Control Officer and Deputy Game Warden, turned up and our plans and future operations were discussed. Mr. Hubback agreed that it would be best to transfer our activities to the large area north of the Bernam river bordering the State of Selangor. On the following day we transported ourselves, our men and our kit in a hired lorry to Lima Blas Estate, a large oil palm concern, French-owned. Mr. Hubback had on the day before telephoned to the Danish Manager, Mr. Iversen, and we were most hospitably received and entertained. I cannot adequately express our appreciation of the hospitality and help we received from Mr. Iversen and his French assistants, Mr. Talau and Mr. Hine, especially the latter. I was glad at the opportunity of meeting again a first cousin of my wife who had married Talau. Hine turned up for dinner at Iversen's bungalow and I was amused to note that the four of us were of different nationalities; Iversen Danish, Hine French and R American. After an early breakfast we left next morning in one of the estate lorries guided by Hine on his motor-bike to the boundary of the estate. Here our kit was dumped while Hine and I walked to a Sakai village across the Bernam river and then on to a further Sakai 'kampong' half-a-mile on. We had to cross the swollen Bernam river singly in a small sampan, the seat of which collapsed while I was in midstream. Hine's shout: 'Be careful, the crocodiles here are awful' just as the sampan was rocking dangerously and shipping any amount of water did not tend to increase the comfort of my mind! Arranging with Sakais there to procure others as porters for the following day we returned to the estate. Shortly afterwards some

of the estate Tamil coolies carried our kit across to the Sakai village (Buloh Seruvas). These Sakais are often referred to by the Malays as '*oran utan*', literally 'people of the jungle', and this also is the meaning of the term used for the ape. I was interested to hear from Hine identically the same yarn as is to be heard in South India regarding the existence of Negrito Pygmies living on trees in the forest, never being seen by any one, and that the Sakais leave rice for them at the foot of trees, just as the jungle tribes in South India are supposed to do. I am convinced this is entirely a myth.

One of our Malay camp coolies developed a badly swollen face through coming in contact with a '*Rongas*' tree. He certainly looked a pitiable sight with his face all swollen, eyes nearly closed and swellings on his neck and chest where he had spread the inflammation by scratching. The effect of touching the bark of this tree is similar to that of the Poison Ivy in America.

Most of the Sakais possess long blow-pipes and use them most skilfully, the poison on their darts being that of the '*Upas*' tree as in North Burma and the Dutch East Indies, the tree in Malay being known as the '*Ipoh*': probably the town of Ipoh draws its name from this tree.

Heavy thunderstorms were of daily occurrence. The loud and musical call of the Argus pheasant was frequently heard all day, as also the calls of the Seermangs and the '*Wah-Wah*' or white gibbon.

Plane had put me on to the best anti-leech footgear I had hitherto seen; ordinary rubber boots with canvas uppers, tongue sewn to sides, and *cloth extensions up to just below the knee sewn into the boot*. Putties over this increase the life of the extensions and the whole is very effectively leech- and mosquito-proof.

These jungles lie directly under the mail-plane route between Europe, India, Burma, Siam, the Dutch East Indies and Australia. So used had the Sakais become to planes flying overhead that they did not deign to look up on hearing them.

We left our camp at Buloh Seruvas, having slept in a vacated Sakai's hut, and arrived at the Sakai village of Changkat Kereta, on the Erong river, in the evening. The going was not too bad but swampy in parts. Two or three old pits were passed, previously used by poachers for trapping rhino. Strangely enough this part of the forest between the Erong and Bernam rivers appeared to be leechless although conditions seemed to be favourable for them. The '*Jelutang*' tree, the sap of which is tapped by the Chinese for the manufacture of chewing gum, occurs in these jungles. At Changkat Kereta I tasted my first Daurian, but I was quickly put off by the sickly smell without which the fruit would be quite palatable. Patches of Liberian coffee are cultivated round the Sakais' huts at Changkat Kereta, also pine-apples, sugarcane, plantains, cocoanuts, areca palms, betel vines and limes. In their clearings (the usual shifting cultivation of jungle tribes) the Sakais grow rice and Cassava (*Tapioca*). We hired a Sakai's house for ourselves at Changkat Kereta and decided



Kroh River.



Sakai hut we occupied at Changkat Kereta (Base camp).

Photos by author.

to make our base camp here. The headman's house was adorned with a large clock and four lamps, two being of the petrol type, one acetylene and the fourth an oil lamp: I think only the last was in working order! The headman was not very helpful at the outset, expressing fear that Sakais would not be available for shikar as they were all out cutting rattan. I felt sure that he was fishing for a present, and on learning from him on the following morning that he *hoped* to be able to supply six men he was told that there was to be no hoping and that we required *eight* men without fail. This firm attitude had immediate results and all the men we required were easily procured. We did not find the climate pleasant, it was like that of a hot-house. R was feeling far from well the whole time and I found that scratches and insect bites on my legs were apt to suppurate. I spent the next three days in searching the forest for miles around for *sondaicus's* tracks but without success, although tracks of *Rhinoceros sumatrensis* were quite common. Here and there patches of ground in the forest, about 12 ft. in diameter, swept clean by the Argus pheasant were to be seen, as also fresh tracks of the Malayan bear (in Malay '*bruau*', probably the origin of 'Bruin' for a bear). Small hornets were a common feature in these forests and our Sakai trackers were frequently stung. On one occasion we had to run from hornets for 200 or 300 yards much to the merriment of the Game Ranger Ngah who thought it was a great joke until he was stung on the neck when his mirth ended in a yelp! The Sakais, like nearly all jungle folk, possess a keen sense of humour and are a cheery crowd: crossing the Erong river on a fallen tree on the first day the leading Sakai was deposited into the river by the log breaking in two, much to the joy of the others. Pig-tailed monkeys (locally known as '*beroko*'—*Macacus nemestrinus*) were common, as also the white-eyed langurs, specimens of both being collected. When the weather is fine the dry parts of the interior of these forests are really beautiful, but their beauty would be better appreciated but for the myriads of mosquitoes and other insects that bite and sting, in which respect these forests must surely correspond to those of Brazil. The fruit of one of the jungle trees, somewhat similar in appearance to a mango and locally known as 'Poonti' was quite good eating, a little like a custard apple. The water in the small rivers in this area was bright red in colour, especially in the case of one stream where the water had the appearance of having been dyed with potassium permanganate, probably due to the fact that these rivers are fed by swamps, the water being coloured by the roots of trees and rotting vegetation. It is noticeable that many of the scientific names of fauna are actually the Malay names for the creatures concerned such as *Tupaia* (tree shrew) from '*Tupai*', the Malay word for a squirrel; *Rusa* (sambhur=*Cervus rusa*), the Malay name for sambhur. The word 'godown' used in India is probably derived from the Malay word '*godang*' (shed) and a 'compound' is said to be derived from '*kampong*' (village) though this may be open to doubt. The traps laid by the Sakais in the jungle are chiefly for the Chevrotain or *Tragulus* (mouse deer) known in

Malay as 'Plandok', pheasant, and porcupine, the same trap serving for all: a wall of *Zalacca* palm leaves being placed on either side of, and across, a game path with a small doorway left for the victim to pass through straight into a noose. The undergrowth in large tracts of the forest is mainly *Zalacca* palm which adds a great deal to the beauty of the jungle. I noticed far less creepers and vines in these jungles than in similar type of forests in Upper Burma. In other parts the ground is covered by three or four species of plants with leaves akin to the Arum lily, and many of the swamps grow three species of tall and dwarf screw-pines. I came on the nest and eggs of a green forest-partridge one day having inadvertently disturbed this very beautiful bird. Sakais attach no value to empty bottles and tins and a lot of these can be seen thrown away round their houses.

On June 13th I left for my advanced camp, having had huts prepared in the forest some 12 miles north of Changkat Kereta, leaving R at our base camp. On my way I shot with my .22 a fine specimen of a male seermang and sent it back to Raven. On arrival at my camp, on the upper reaches of the Erong, I had a bathe in the river while the Sakais completed a hut for themselves. That night I slept little being devoured by myriads of midges that invaded my mosquito curtain. For three days the jungle was searched for *sondaicus's* tracks without success. I had Sakais out in different directions quartering the jungle with the offer of a good reward for the discovery of a *sondaicus's* tracks. On the fourth day while some miles north-east of camp two Sakais caught me up and produced a $8\frac{1}{2}$ in. stick which was declared to be the measurement of a fresh rhino track they had found. Although this was a bit small for a *sondaicus's* track I decided to follow it up. Returning to camp at noon I sent a Sakai to R with the information, and with Ngah and three men reached the spot where the rhino's tracks had been found 45 minutes later. The rhino's tracks had been found on a forest boundary separating the Chawang and Sungkei Reserves. Following up the tracks we eventually reached its wallow and from here on for a considerable distance the undergrowth through which the rhino had gone was caked with grey mud and our clothes were very soon similarly covered, and very much the worse for wear, following the rhino's path through rattan and *Zalacca*. Ngah's excellent tracking surprised me. We later came on a heap of the rhino's faeces, somewhat similar to a horse's droppings. It is well known to a rhino poacher that a rhinoceros is wont to return to the same spot to defecate, a habit it shares with some of the antelopes, and this, as often as not, leads to its destruction, the poacher occupying a machan over the spot. A rhino is worth Rs. 1,000 or more to the poacher, its chief value is in its horn, but every part of it possesses a definite value, including the blood, as an aphrodisiac. Shortly afterwards we came on the fresh tracks of a solitary elephant which sometimes covered the tracks of the rhino; and our difficulties were increased by a heavy thunder-storm which made it well nigh impossible to distinguish new from old rhino tracks. Added to this the light was becoming



Bernam River. Boundary between Perak and Selangor States.



Camp in dense evergreen forest in the Bernam area.

Photos by author.

very poor and I abandoned the search for the day. Although I felt fairly sure that the tracks were those of a large *sumatrensis* I decided to have this confirmed. It took us two hours to reach camp and a large part of the going was perfectly poisonous, we were frequently up to our knees in mud and water. Early next morning I left with Ngah and two men sending the remaining Sakais on to the Chawang river to prepare a new camp. Taking up the rhino's tracks again we found at about mid-day that the tracks had led under a fallen tree under which it was obviously impossible for a *sondaicus* to pass. This settled the question beyond doubt and we found our way to the Chawang camp by compass bearing. Later in the day we returned to our first camp and found R had arrived, and that night we discussed our future plans. We both felt that there was little chance of our coming on the tracks of a *sondaicus*, and R decided to catch the P. & O. boat to Hongkong from Singapore on the 20th, which involved his leaving for Teloh Anson early on the following morning. The forest west and north-west of the Chawang river had still to be examined, and I did not wish to abandon the search until this had been done, although I felt there was very little hope of success. Further I now had low fever nearly every day, and my legs were in a bad state from suppurating scratches and insect bites. R left early next morning still feeling none too well. Soon after he left I shifted everything to the new Chawang camp and arrived there feeling unable to do any tracking that day. Ngah and the Sakai trackers were sent out to continue the search. 'Miowk', my gibbon, who had been my devoted companion all through, was stung by a hornet on a tree near the camp and retreated yelling. Ngah and his men returned in the evening without having found anything but new elephant and *sumatrensis*' tracks. The next day found me still feeling feverish, but I accompanied Ngah while the other trackers went off in different directions as usual. No success attended our efforts either this or the following day. As our search had fairly covered this last area I decided to strike camp and return to headquarters, Teloh Anson. We left the Chawang river camp next morning and reached Changkat Kereta that afternoon. Here I paid off the Malays and all the Sakais, retaining those of Buloh Seruvas to accompany me to Lima Blas estate on the following day. My heavy outfit I sent round by boat down the Erong and Bernam rivers to Utan Milintang in charge of Gabriel, my skinner, with instructions to engage carts or a lorry for the kit and himself, Ngah, and our hardworking camp boy Mahmet, to Teloh Anson. The camp supplies that remained over in the shape of tinned fruits, rice, sugar, salt etc. I divided up between the camp staff. That evening I went over to the headmans' house hearing music and much noise, and found the Malays and Sakais gambling away all their pay! One of the Sakais was playing a violin quite well.

Leaving Changkat Kereta next morning I walked, carrying my gibbon, with the Buloh Seruvas Sakais arriving there at about noon. Here we were greeted by two damsels. These two young

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ladies, pretty girls in their way, went through the most blatant vamping tactics, directed at Raven and myself on our previous visit to the village, strutting around in gay rags and faces covered with powder and to our surprise using lip sticks and mirrors. Their remark in passing 'We are following you, Tuan', an idiom in itself, evoked our reply that we were taking no camp followers.

The Sakais of Malaya are considered to be the surviving representatives in the Malay Peninsula of the Indo-Malayans, as the Nagas, Kachins, Chins, Wahs, etc. are in Burma and Assam. The Tarajas of the Celebes, the Dyaks of Borneo and the hillmen of the mountains of Formosa and Philippines exhibit many of the same characteristics, have many of the same customs, and even similar words in their languages and nearly all are spirit worshippers. The 'Nat' poles, topped with funnel-shaped caskets, of the Burma races have very similar counterparts with the races of Malaya, the Dutch East Indies, Formosa and the Philippines.

A message that I was returning to Lima Blas had been sent on ahead and Hine met me between the Bernam river and the estate boundary. Arriving at Iversen's bungalow I arranged to leave for Teloh Anson the same evening in a hired car. Cars and lorries can be hired in Malaya at just about one-third of the rates in India. I reached Teloh Anson in what must have been almost record time, the driver being of the reckless speed-fiend type. Back in Teloh Anson I felt considerably better although pretty tired with my long day. The forests we had been through were, except for a few *sumatrensis*, tapir, pig, bear and elephant well-nigh gameless as was our experience in most of the evergreen forests of Upper Burma.

The next day was spent in drawing out funds from the Bank, in farewell visits to Mr. and Mrs. de Moubray and Mr. Ferguson and in re-sorting and packing up my outfit. My skinner Gabriel, Ngah, and Mahmet having turned up at noon I left the same evening on the s.s. *Krian* and arrived at Penang at 9 a.m. on the following morning. After making arrangements for the transfer of my luggage to the Madras boat, the s.s. *Rohna*, I spent the morning in Penang getting tickets for passages (Mahmet to Rangoon) and export licenses for my weapons. The s.s. *Rohna* sailed at 2 p.m. and the shores of Penang and Malaya were soon out of sight. Our route lay close in to the shores of Sumatra which we finally left behind us at noon on the following day. Our arrival at Madras on June 30th brought to a close an expedition which, though unsuccessful in its main object, was both interesting and instructive.

A further attempt to procure a specimen of a *Rhinoceros sondaicus* will probably be made in Sumatra where this species still exists.

THE INDIAN CADDIS-FLIES (*TRICHOPTERA*).

BY

MARTIN E. MOSELY, F.R.E.S.

(With 16 text-figures and 18 plates).

PART IV.

(Continued from page 133 of volume xxxviii).

LIMNOPHILIDAE.

Kolenati.—Gen. et Spec. Trich., vol. ii, p. 29, 1859.

CHARACTERS OF THE FAMILY.

Antennae as long as (rarely longer than or slightly shorter than) the wings, moderately stout, the basal joint bulbous. Ocelli always present. Maxillary palpi three-jointed in the male, five-jointed in the female, similar in structure in both sexes, only slightly pubescent, the basal joint short. Labial palpi small, the end joint often concave. Legs usually rather long; tibial spurs varying greatly, but the anterior tibiae are either spurless or have only one (apical) spur (excepting in *Astratus* where there is an unusually formed double black spur) and the intermediate have never more than three; tibiae and tarsi usually with strong spines. Abdomen generally short and robust; the margin of the eighth segment often produced. The appendages of the male tolerably constant in general character; that is to say, there is a pair of (ordinarily) small superior appendages, a pair of (ordinarily) lanceolate intermediate appendages, and a pair of inferior appendages, often fused to the ninth segment. Between these appendages is placed the penis which is usually short and cylindrical and generally accompanied by a pair of sheaths which are often bifid or pectinate.

In the female the ninth segment is nearly always visible both dorsally and ventrally; above, it is generally accompanied by a pair of pubescent appendages, and below them there is ordinarily a testaceous tubular piece open in front. On the surface of the eighth ventral segment is the vulvar scale which is generally trifid, consisting of two side lobes and a more or less tongue-shaped median lobe.

Wings usually ample and only slightly pubescent; but sometimes there is a close dense pubescence and the membrane may be granulose and with long erect hairs which are more frequently confined to the veins. Normally the neuration is similar in both sexes. In the anterior wing, the discoidal cell is always closed (excepting in one or two aberrant forms); the sub-costa ends usually in the costa but in one sub-family it ends abruptly in a

transverse nervule between the costa and radius; there is no median cellule and the cellula thyridii is always long and narrow; four basal cellules; the anastomosis is usually divided into two portions, the lower placed nearer the base of the wing than the upper but in some genera both portions are nearly in line; there are nine apical cellules, and forks Nos. 1, 2, 3 and 5 are present. The posterior wings are shorter and much broader, and broadly folded; the anal portion usually well developed: discoidal cell usually closed (but open in one group); eight apical cellules and forks Nos. 1, 2, 3 and 5 present.

There are three very anomalous genera which, however, have not as yet been recorded in the Indian fauna, *Anomalopteryx*, *Thamastes* and *Enoicyla*; of these the first two depart widely in their neurulation from the general form, with rudimentary posterior wings, and, in *Enoicyla*, the female insect is to all intents and purposes, apterous.

There are several female examples in the British Museum and the author's collections belonging to the *Limnophilinae*. I refrain from naming these as it is very probable that some at least may be associated with males either already described or perhaps described here as new.

SUB-FAMILIES.

LIMNOPHILINAE Ulmer.

APATANIINAE Ulmer.

CHARACTERS OF THE SUB-FAMILIES.

1. In the anterior wing, the sub-costa continues to the costal margin. LIMNOPHILINAE Ulm. (Text-fig. 1).
2. In the anterior wing, the sub-costa ends in a cross-vein joining the radius and costal margin. APATANIINAE Ulm. (Text-fig. 14).

LIMNOPHILINAE Ulmer.

Limnophilinae Ulmer.—Ab. Natur. Ver. Hamb., xviii, pp. 42, 46, 1903.

The sub-family of the *Limnophilinae* contains most of the Indian *Limnophilid* genera, and might well be further subdivided in a work having a world-wide range. There are objections, however, to the creation of sub-families to deal with the fauna of a particular region, so I shall therefore restrict myself to the collecting together of certain genera into two groups in the hope that this course may render easier the study of the Indian *Limnophilinae*.

First will come the group of *Colpotautius*, characterised by the formation of the anterior legs of the male, which differ from those of the female in having a deep groove along the femora lined with short black setae, and in the genera *Colpotautius* and *Astratus*, having peculiarly shaped black spurs. In *Astratodina* the groove is present, but there are no spurs.

The remaining genera will not fit comfortably into a single group although most of them follow closely the pattern of Martynov's *Pseudostenophylax*.

I omit the European genus *Stenophylax* from my tables. Navás has described an Indian species in this genus. I am unable to recognise it from the description, and I think it doubtful in the extreme that the genus is really *Stenophylax* as we know it in Europe.

TABLE OF THE INDIAN LIMNOPHILINAE GENERA.

1. Insects in the male with a groove lined with black setae on the anterior femora, generally with a specialised black spur on this leg; female leg normal. (*Colpotaulius* group) 2
—Anterior leg of the male without the groove or specialised spur. 4
2. No specialised spur on the anterior leg. ASTRATODINA gen. nov. p. 450
—One or more specialised spurs on the anterior leg. 3
3. A single specialised black spur. COLPOTAULIUS Kol. p. 451
—Paired black spurs. ASTRATUS McLach. p. 452
4. In the male, first joint of the anterior tarsus much shorter than the second; discoidal cell in both sexes strongly excised along its upper margin. MICROPTERNA Stein p. 454
—In the male, first joint of the anterior tarsus not shorter than the second. 5
5. In the male, posterior wing with specialised scales or specialised hairs. 6
—Male posterior wing without such scales or hairs. 7
6. Scales or hairs in the anal region of the posterior wing either entirely or partly along A_2 . PSEUDOSTENOPHYLAX Mart. p. 455
—Scales or hairs along the region of the sector. ASTENOPHYLODES gen. nov. p. 458
7. Posterior wing of the male with a strong triangular anal projection. STENOPHYLINA Mosely p. 460
—Posterior wing of the male normal. 8
8. All the tergites covered with long silky hairs. TRICHOPHYLAX gen. nov. p. 461
—Tergites normal. 9
9. Anterior wing of the male with a mass of black setae occupying the basal half of the costal area. PSEUDOHALESUS Mart. p. 462
—Anterior wing of the male without such setae. 10
10. Distal margin of the anterior wing undulating, neuration of the male posterior wing abnormal with only fork No. 5 present. HALESINUS Ulm. p. 465
—Margin of the anterior wing not undulating; posterior wing of the male normal. 11

11. Spurs 1, 2, 2. 12
 —Spurs 1, 3, 4. 13
12. Fork No. 3 of the posterior wing passes the cross-vein at its apex. PLATYPHYLAX McLach. p. 467
 —Fork No. 3 of the posterior wing meets the cross-vein at its apex. PHYLOSTENAX Mosely p. 468
13. Superior appendages very long, blade like (see Text-fig. 11). ANABOLIA Steph. p. 470
 —Superior appendages not so long. 14
14. Discoidal cells of both wings much longer than their foot-stalks. STENOPHYLIELLA gen. nov. p. 471
 —Discoidal cells of both wings shorter or as long as their foot-stalks. ASTENOPHYLINA gen. nov. p. 473

Astratodina gen. n.

Closely allied to *Colpotaulius* and *Astratus* but the ♂ without the specialised spurs on the anterior legs.

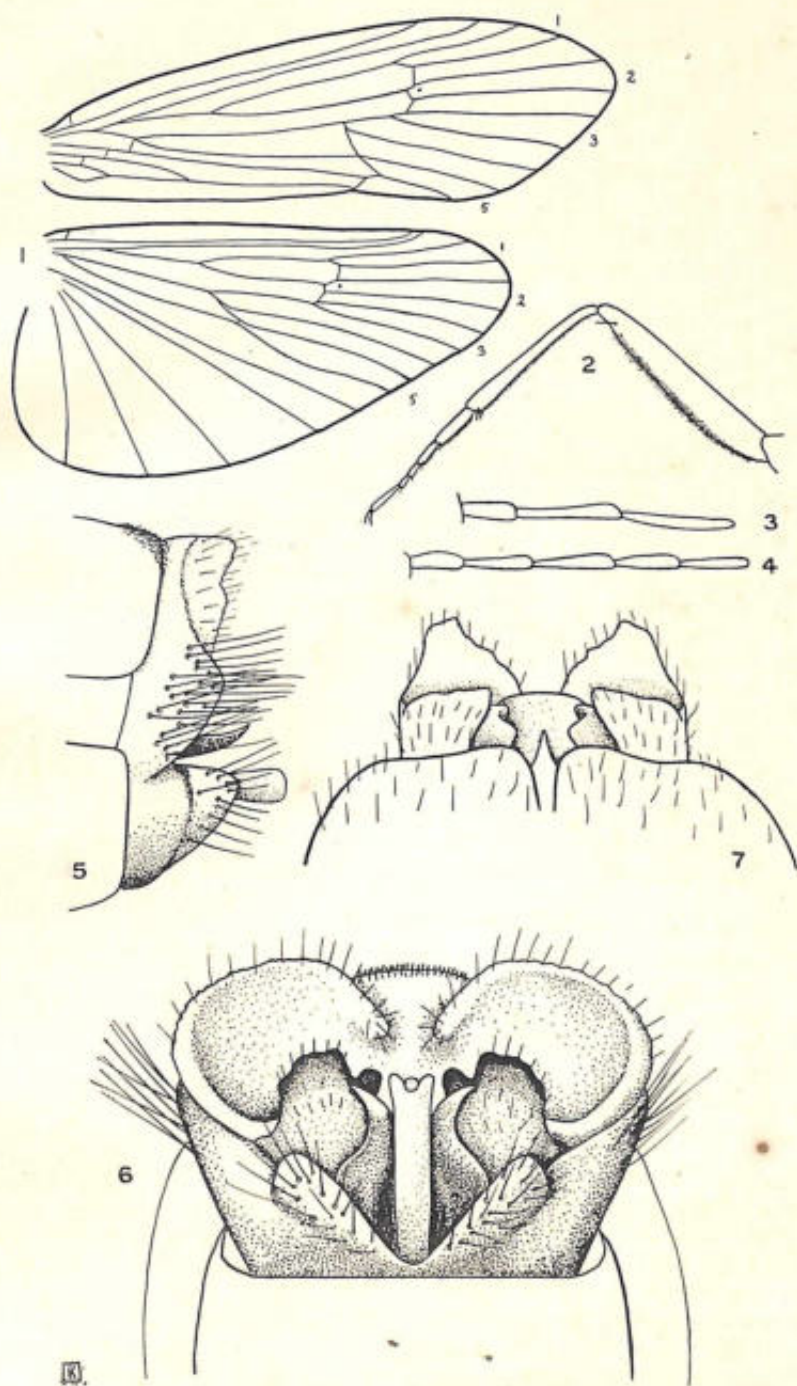
Antennae slender, about the length of the anterior wings, basal joint large and rounded, particularly on the inner side, next joint short; maxillary palpi ♂, first joint short; second long, about four times the length of the first; third slightly shorter than the second; ♀, basal joint short, about half the length of the second; third slightly longer than the second; fourth slightly longer than the first; fifth about as long as the second. Anterior wings elongate, costa somewhat rounded, apex sub-acute discoidal cell long (in both anterior and posterior), membrane granulate; legs differing in the sexes; ♂ with the anterior formed as in *Astratus* but without spurs, femora with a groove lined with black setae which are present also on the tibiae; first tarsal joint more than twice the length of the second; spines black, no spines on the terminal-tarsal joints; spurs 0, 2, 2 ♂; 1, 2, 2 ♀.

Genotype: *Astratodina inermis* sp. n.

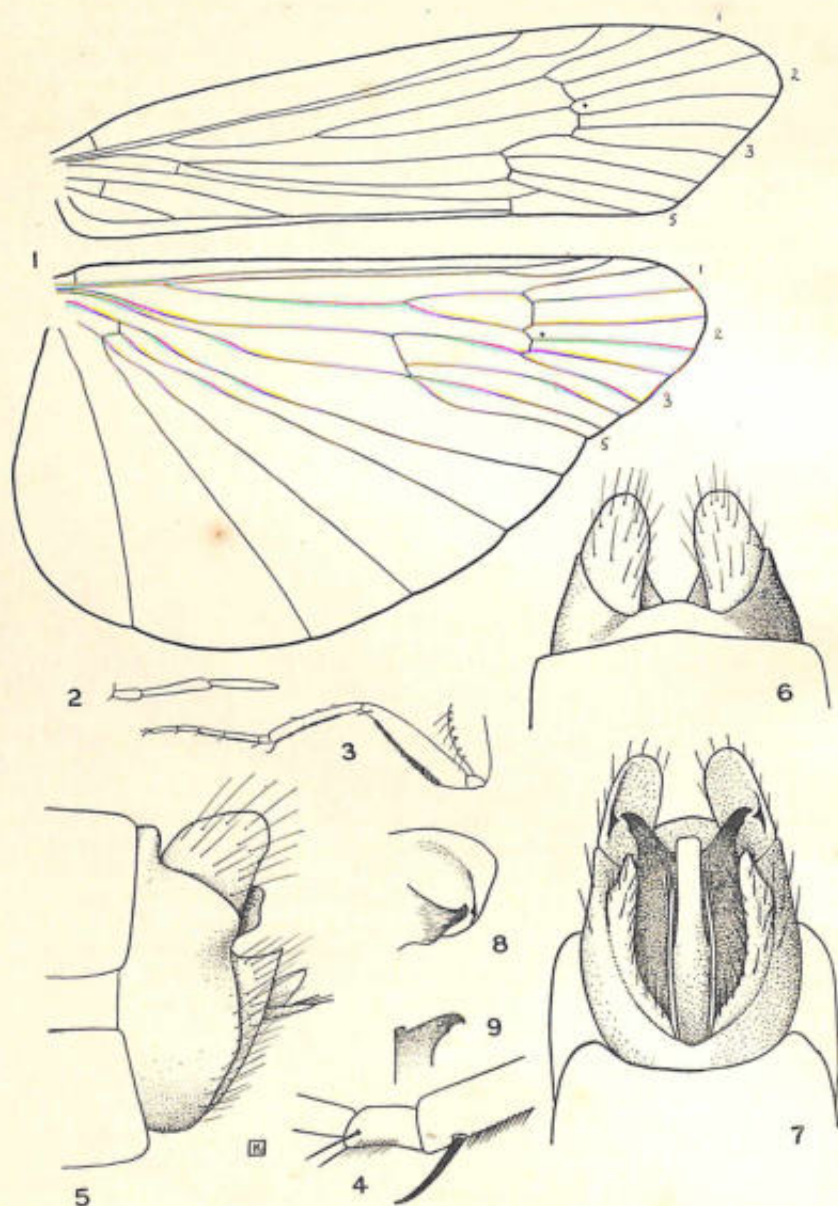
Astratodina inermis sp. n. (Pl. I, figs. 1-7).

Head dark fulvous, antennae lighter in colour than the head with still paler annulations; palpi and legs, pale fulvous; the anterior femur carries a single black spine (not a spur) on its outer surface towards the apex. Anterior wing elongate, cinereous with yellowish irrorations, membrane granulate with short yellowish hairs, fringes yellowish; neuration inclined to aberrancy, in one example the second and third apical sectors are bent inwards towards each other and united on one side by a cross vein, in others, neuration is normal.

Genitalia ♂.—Margin of the eighth dorsal segment rounded and set with short black setae; superior appendages are welded to the ninth segment making a pair of large rounded processes as seen from above; the ninth segment towards the centre of its lateral margin is heavily fringed with long stout bristles; from behind may be seen a pair of broad, strongly chitinised intermediate appendages, apices truncate, slightly serrate and deeply



Astratodina inermis sp.n., Fig. 1, wings ♂. Fig. 2, anterior leg ♂. Fig. 3, maxillary palpus ♂. Fig. 4, maxillary palpus ♀. Fig. 5, genitalia ♂, lateral. Fig. 6, ventral and slightly from behind. Fig. 7, genitalia ♀, ventral.



Colpotaulius major Mart., ♂. Fig. 1, wings. Fig. 2, maxillary palpus. Fig. 3, anterior leg. Fig. 4, specialised spur enlarged. Fig. 5, genitalia, lateral. Fig. 6, dorsal. Fig. 7, from behind. Fig. 8, superior appendage with apex of intermediate appendage, from within. Fig. 9, apex of intermediate appendage from behind.

notched towards their inner margins; penis-sheaths very strong and heavily chitinised, bases broad, apices acute, curving outward on each side of the penis which is short and straight; inferior appendages small and rounded, thickly beset with strong hairs and projecting only slightly beyond the ninth segment to which they appear to be welded.

♀.—The surface of all the dorsal segments set with minute setae, rather longer at the apical margin of the eighth; beyond this segment are two broad triangular processes with the inner margins somewhat serrate and carrying small rounded forks at their bases as seen from above; as seen from beneath, the processes are continued in broad inturned plates of which the inner apical angles appear as pointed projections; vulvar scale with two broad wings and a small and acute inner process; previous segment deeply and narrowly excised in the centre of its apical margin.

Length of anterior wing ♂ 12 mm.

Length of anterior wing ♀ 16 mm.

Western Tibet; Lhabaps, ft. 11,855, 23-vi-1932 G. E. Hutchinson, Yale North India Expedition.

Type ♂ and paratype ♀ in the British Museum collections, other paratypes ♂ and ♀ from the same locality in the collections of the Yale University, United States of America.

Colpotaulius Kol.

Colpotaulius Kolenati.—Gen. et Species Trichop., pt. 1, p. 47, 1848; McLachlan.—Rev. & Syn. Trich., p. 34, 1874; Ulmer.—Gen. Insect., fasc. 60a, p. 36, 1909.

Maxillary palpi ♂, basal joint less than half the length of the second which is slightly longer than the third; spurs 1, 3, 4 ♂ ♀ but that on the anterior tibia of the ♂ is differently formed to the equivalent spur in the ♀ being intensely black, sometimes long and thin with merely the apex slightly curved, sometimes stout and curved resembling a strong spine. First joint of the anterior tarsus in the ♂ only half the length of the second, whereas in the ♀ it is nearly one-third longer than the second. Tibiae with few spines on the anterior but they are more numerous on the two other pairs and on the tarsi; the anterior legs of the ♂ short and stout, the tibia fitting into a groove on the inner side of the femur, this groove being clothed with short and dense black setae. Antennae about the length of the wings, moderately stout. Anterior wings elongate with moderately dense short pubescence and evident apical fringe, costal margin gently rounded, the apex sub-acute; discoidal cell very long and narrow; no marked pterostigma. Posterior wings very deeply incised below the apex at the point where the lower branch of the cubitus terminates.

Genotype: *Colpotaulius incisus* Curt.

Colpotaulius major Mart. (Pl. II, figs. 1-9).

Colpotaulius major Martynov.—Zool. Jahrb. Bd. xxvii, pp. 516-8, pl. 24 figs. 1-4, 1909.

C. incisus Curt. n. var. Martynov.—Ann. Mus. Zool. ac. sci. U.R.S.S., vol. xxvi, p. 24, Pl. II fig. 9, 1925.

Head and thorax clothed with yellowish-grey hairs; antennae brownish testaceous with light-ochraceous annulations. Wings yellowish with brownish markings; under-surface of the anterior femora of the ♂ set with close black hairs, the abnormal single spur of this leg long, black and slightly curved at the tip.

Genitalia ♂.—Margin of the ninth dorsal segment slightly produced and rounded; superior appendages from above, large, obscuring all the rest of the genitalia excepting the inner margins of the intermediate appendages; the lower margin of each appendage is produced at its centre in a short, blackened, triangular, inturned spur; intermediate appendages from the side, broad at the bases terminating in acute blackened apices (hidden by superior appendages); from beneath, the appendages are directed slightly outward and are notched towards the inner angles of their apical margins so that they resemble a pair of boots placed heel to heel with the soles directed upwards and the toes well turned out; penis straight, apex blunt; penis-sheaths long and slender, apices pectinate; inferior appendages welded to the ninth segment; from the side, triangular, only slightly projecting beyond the line of juncture with the segment; from beneath, with only the apical third free and distinct from the segment, apices acute.

Length of anterior wing ♂ 12 mm.

Kashmir, Caucasus, Kamtshatka.

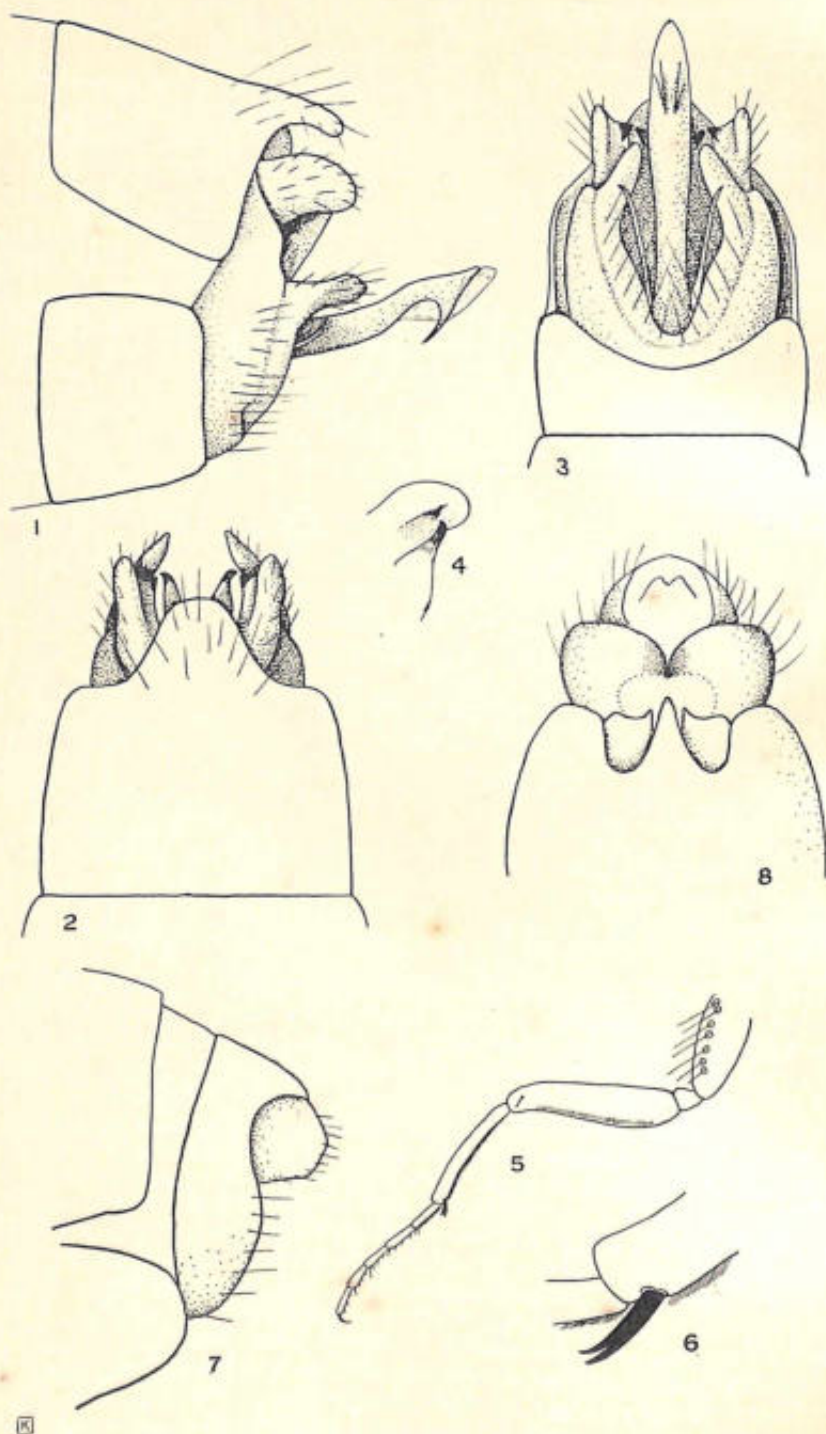
In the Ann. Mus. Zool. Ac. Sci., 1925, Martynov describes from Kamtshatka, a *Colpotaulius* as a variety of *C. incisus* Curt. The genitalia as figured differ far too widely from those of Curtis's species for the Kamtshatka insect to be associated with it even as a variety. On the other hand, the figures of these parts are indistinguishable from those given with the description of *C. major* and I conclude, in spite of the wideness of the range that the so-called variety is in fact this species.

Astratus McL. (Text-figs. 1-3).

Astratus McLachlan.—Rev. and Syn. Trich., p. 36, 1874; Ulmer.—Gen. Insect., fasc. 60a, p. 37, 1907.

Maxillary palpi ♂, first joint about two-thirds the length of the second which is slightly longer than the third.

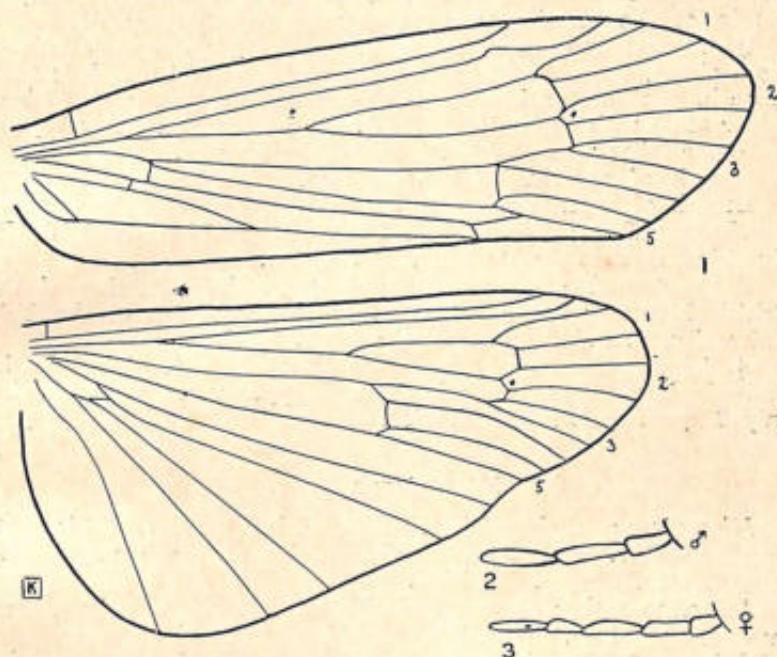
Maxillary palpi ♀, first joint about two-thirds the length of the second which is slightly shorter than the third, fourth as short as the first, fifth as long as the third; anterior wings elongate with moderately short pubescence; discoidal cell long and narrow; posterior wings somewhat excised below the apex; spurs ♂, 2, 3, 4 or 2, 3, 3, ♀ 1, 3, 4 or 1, 3, 3; anterior legs differing in form in the two sexes; in the male, femora broad, lower margins of the femora and tibiae lined with fringes of short black setae; spurs 2 in number, long, black, slightly hooked at the apices and set closely together in juxtaposition so that the presence of a second spur may easily be overlooked; first joint of the tarsus much longer than the second; in the female, the anterior leg normal with a single normally formed spur and no fringes of black setae; in the ♂ margin of the eighth dorsal segment strongly produced at its centre with the extreme apex generally fringed with short



Astratus tricalcaratus sp.n., ♂. Fig. 1, genitalia, lateral. Fig. 2, dorsal. Fig. 3, ventral and from behind. Fig. 4, superior appendage with apex of intermediate appendage, from within. Fig. 5, anterior leg. Fig. 6, specialised spurs of the anterior leg, enlarged. Fig. 7, ♀ genitalia, lateral. Fig. 8, ♀ genitalia, ventral.

black setae; inferior appendages welded to the sides of the ninth segment.

Genotype: *Astratus asiaticus* McL.



Figs. 1-3. *Astratus tricalcaratus* sp. n., Fig. 1, wings ♂. Fig. 2, maxillary palpus ♂. Fig. 3, maxillary palpus ♀.

***Astratus tricalcaratus* sp. n.** (Text. figs. 6-7; Pl. X, figs. 1-3).

Head testaceous, oculi dark testaceous, antennae of the same colour with darker annulations. Wings long, narrow, greyish, nervures dark; spurs ♂ 2, 3, 3, ♀ 1, 3, 3; spurs of the anterior leg ♂ as detailed in the generic description.

Genitalia ♂.—The apical margin of the eighth dorsal segment is strongly produced at the centre but there is no mat of short black setae lining the extreme apex; superior appendages from above, rather long; to each appendage there is an inner ridge carrying a stout spur whose extreme apex is blackened; this spur may be seen, both from above and beneath, projecting beyond the inner margin; from the side, the appendage is broad, broader at its base; intermediate appendages from the side, concealed by the superior appendage; they are very broad at the bases narrowing to strongly chitinised blackened and slightly hooked apices directed upwards and, from above, slightly outward; penis from the side deeply notched on the underside before the apex which carries two slender spines on its underside directed

downwards and towards the base; penis-sheaths long and slender, curving slightly upwards from the side, divergent from beneath; inferior appendages welded to the sides of the ninth segment; from above narrow, apices directed slightly inward; from the side, the apices appear slightly twisted; lower margins strongly fringed; margin of the terminal ventral segment widely excised.

♀ General appearance resembling that of the ♂; genitalia.—From above, terminal dorsal segment produced and rounded; from beneath, can be seen below this segment two large rounded lobes; vulvar scale with a slender central piece extending slightly beyond the outer lobes whose apical margins are sinuous.

Length of anterior wing ♂ 9 mm.

Length of anterior wing ♀ 9.5 mm.

Western Tibet; Pangur Tso, 14,203 ft., 13-14-viii-1932, G. E. Hutchinson, Yale North India Expedition.

Type ♂ and paratypes ♂ and ♀ in the collection of the British Museum; other paratypes in the collection of the Yale University, U.S.A., all from the same locality.

A. tricalcaratus closely resembles Martynov's *A. alaicus* in the genitalia but differs vastly in general appearance and in having only 3 spurs to the posterior leg.

Micropterna Stein.

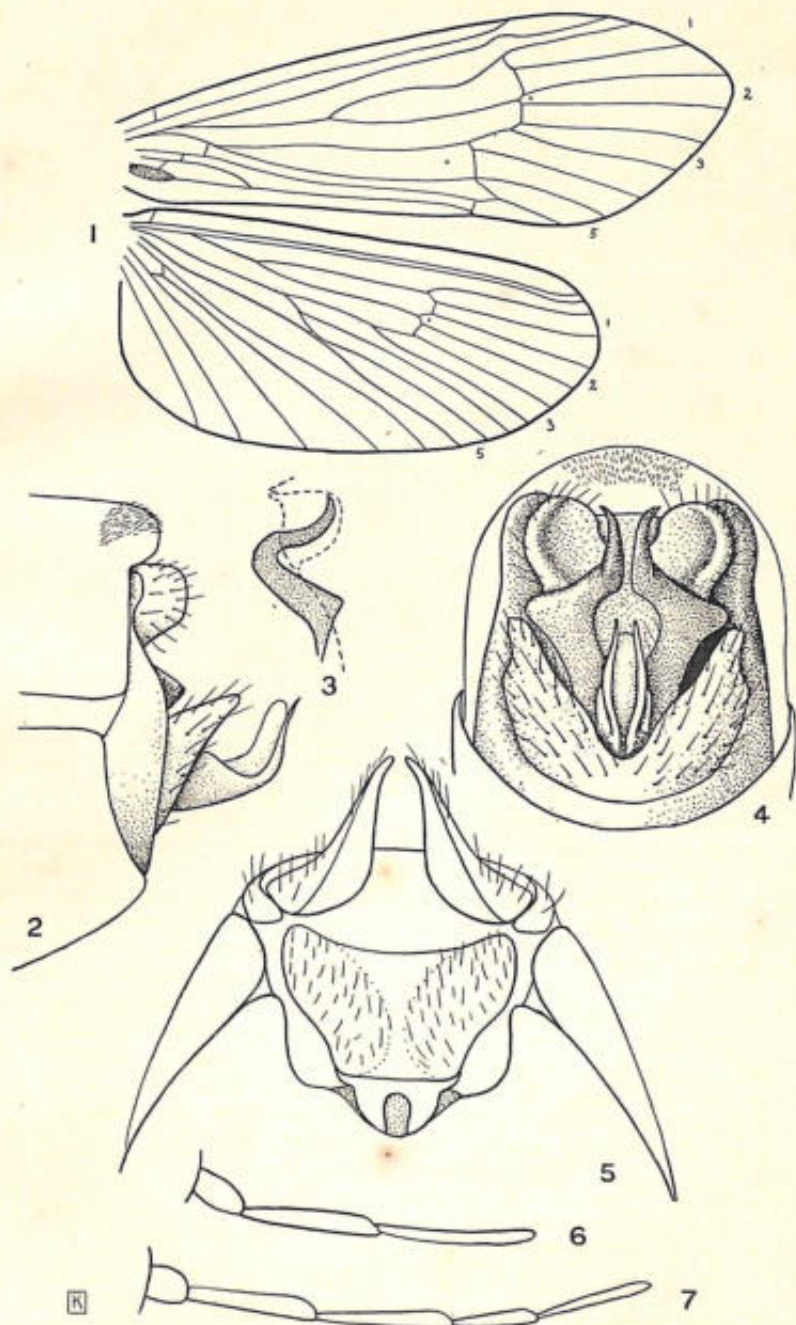
Micropterna Stein.—Stett. Ent. Zeit., p. 247, 1874; McLachlan.—Rev. and Syn. Trich., p. 137, 1874; Ulmer.—Gen. Insect., fasc. 60a, p. 53, 1907.

Antennae rather slender and shorter than the anterior wings; maxillary palpi ♂, first joint very short and rounded, second and third long; ♀, first joint very short, remaining joints long, with the fourth slightly shorter than the others. In the anterior tarsi of the ♂, the basal joint is very much shorter than the second joint and is sometimes thickened; spurs generally 0, 3, 4 or 0, 3, 3 in the ♂ and 1, 3, 4 in the ♀ but in the single described Indian species, the spurs are doubtful and appear to be 0, 2, 2 in the ♂ and 1, 2, 2 in the ♀. Anterior wings ordinarily elongate and broad with the apices sometimes rounded, sometimes sub-acute, costal margin more or less arcuate, pterostigma as a rule absent, discoidal cell strongly excised on its upper edge, first apical cell somewhat rounded at the base, third and fifth sub-acute, second and fourth slightly truncate; posterior wings broad, not perceptibly excised below the apex; the margin of the eighth dorsal segment is generally inturned and densely clothed with short black setae.

Genotype: *Micropterna testacea* Gmelen.

Micropterna indica sp. n. (Pl. IV, figs. 1-7).

Head ochraceous, antennae ochraceous, long and slender, palpi of the same colour; mesothorax ochraceous in the centre with wide black patches on each side; metathorax with two rounded black patches. Wings large, anterior rather long, apex sub-acute, pale stramineous, rather darker along the costa and sub-costa



Micropterna indica sp.n. Fig. 1, wings ♂. Fig. 2, genitalia ♂, lateral. Fig. 3, portion of intermediate appendage, lateral. Fig. 4, genitalia ♂, from behind. Fig. 5, genitalia ♀, ventral. Fig. 6, maxillary palpus ♂. Fig. 7, maxillary palpus ♀.

and towards the pterostigma which is only slightly indicated; in both sexes there is a narrow cell towards the base pigmented entirely with dark ochraceous; posterior wing broad, pale ochraceous. Legs ochraceous. Spurs of the anterior legs, 0 in the ♂ and 1 in the ♀; on the median and posterior legs doubtfully 2 in both sexes.

Genitalia ♂.—Margin of the eighth dorsal segment truncate and set with a close mass of rather pale coloured setae as compared with the black setae of most European species in the genus; superior appendages small and rounded, not visible from above and appearing as rounded lobes from the side; intermediate appendages only visible from behind, stout, black, their centres approximating each other, apices directed outward, bases diverging widely; penis slender, sheaths very slightly longer than the penis; as seen from the side, broad at the base narrowing abruptly at the centre and from there directed upward in a slender spine; inferior appendages from the side, wide at the base and tapering rather suddenly to a blunt apex.

Genitalia ♀.—From beneath, the abdomen terminates in a pair of finger-like processes, broad at their bases, apices acute; below these are two reniform, strongly chitinated hairy plates towards the base of which is the vulvar scale with broadish wings and a small central lobe.

In both sexes the margins of the sixth and seventh ventral segments are set with minute teeth.

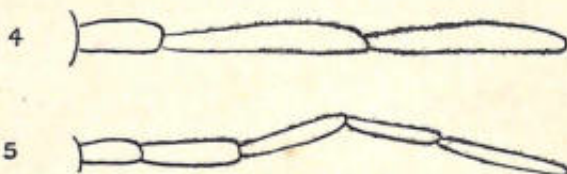
Length of anterior wing ♂ 18 mm.

Length of anterior wing ♀ 20 mm.

Type ♂ and paratype ♀ taken coupled, Kashmir, ft. 5,600, Khanabal, 20-ix-1923, Dutt. Coll. from the collection of the Imperial Institute of Agricultural Research, Pusa, Bihar, now in the collection of the British Museum.

***Pseudostenophylax* Mart. (Text-figs. 4-5).**

Pseudostenophylax Martynov.—Ann. Mus. Zool. Acad. Imp. St. Peters, vol. xiv, pp. 281-2, 1909; Proc. Zool. Soc. Lond., Pt. I, No. 6, pp. 91-2, 1930.



Figs. 4-5. *Pseudostenophylax himalayanus* Mart., Fig. 4, maxillary palpus ♂.
Fig. 5, maxillary palpus ♀.

♂ Maxillary palpi slender, first joint short, second and third more than twice the length of the first. ♀ first joint short,

second nearly twice its length, third and fifth longer than the second, fourth as long as the second. Spurs 1, 3, 4. Terminal joint of each tarsus without spines (or with two or three very short ones only); anterior wings broad, rounded at the apices, greyish-yellow or testaceous with yellow spots; nervures strong; membrane granulose with very short semi-erect hairs; discoidal cell very long, much longer than its foot-stalk. Posterior wings sub-hyalin, posterior margin excised in the region of fork No. 5, fourth apical cell as broad as the second; in the anal region of the ♂ wing there are specialised hairs or scales.

Genotype: *Pseudostenophylax fumosus* Mart.

***Pseudostenophylax martynovi* sp.n. (Pl. V, figs. 1-6).**

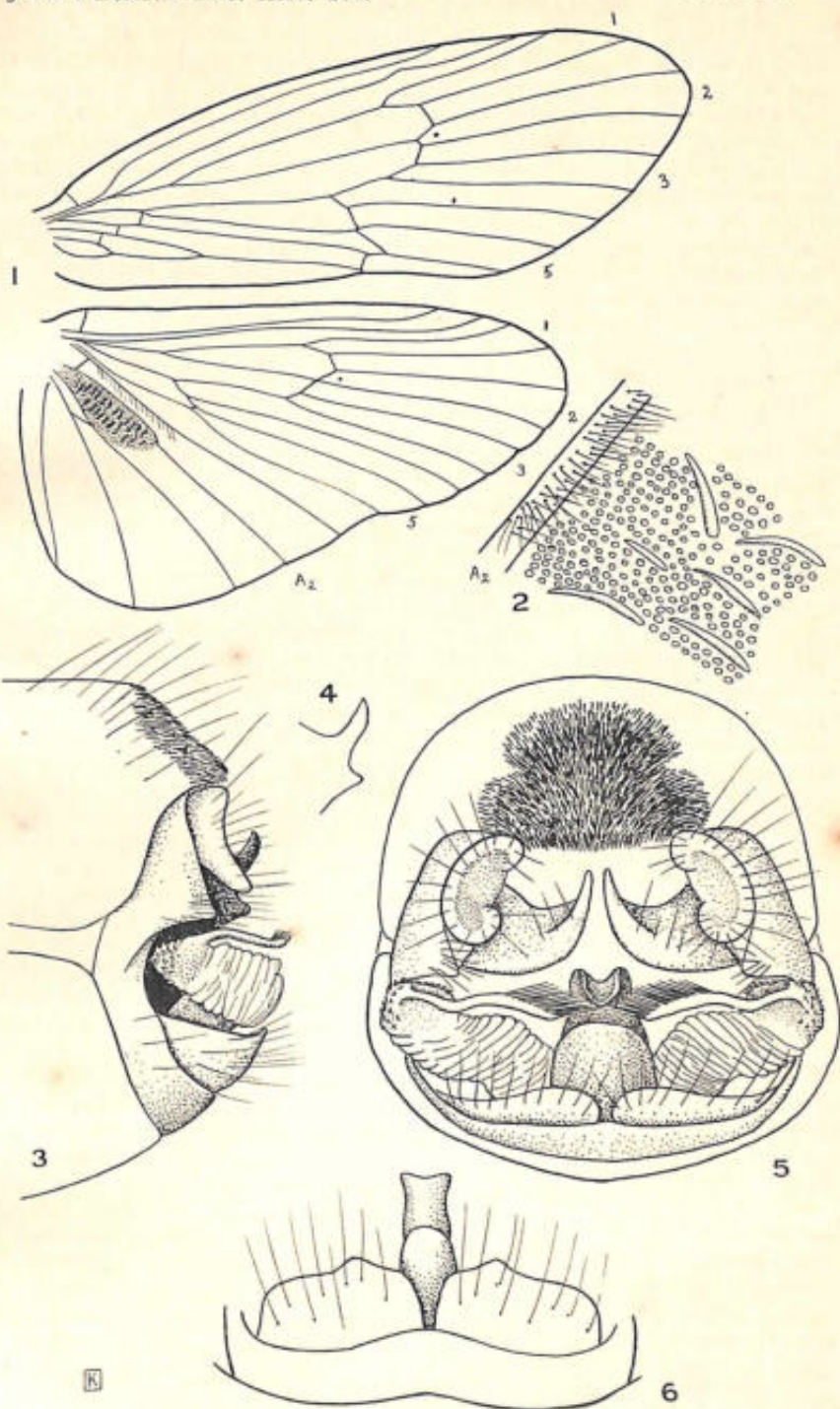
Pseudostenophylax himalayanus Martynov *partim*.—Proc. Zool. Soc. London, Part I, No. 6, pp. 92-5, figs. 37-41, 1930.

Head dark ochraceous, antennae and palpi pale ochraceous; wings, anterior, brownish irrorated with round yellowish spots; membrane granulose with numerous semi-erect and very fine black hairs and with a mass of dense black hairs fringing the costa making a narrow black rim to the costal margin. There is a dense mass of black hairs in the subcostal region at the base of the wing. Membrane of the posterior wing finely granulose, covered with small semi-erect dark hairs; at the base of the second anal vein is a long, rather broad yellowish area free from hairs but set transversely with some wide yellowish wax-like scales, the structure of which is very obscure. There is no fringe of scales clothing the second anal vein as in *himalayanus* and the yellowish area is confined to basal third of the vein. Basal portion of the wing deeper in proportion to its length than in *himalayanus*.

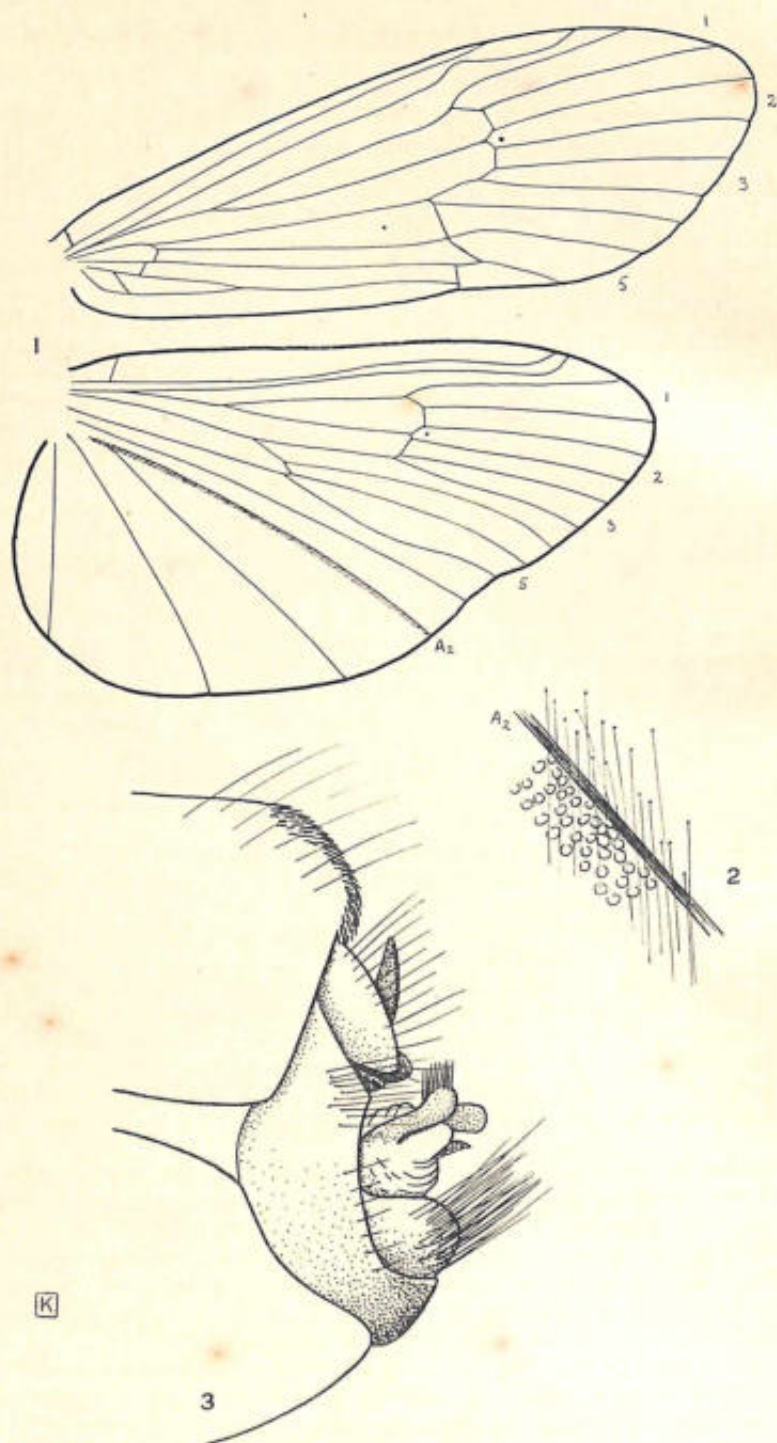
Genitalia ♂.—The margin of the eighth dorsal segment is produced and clothed with a dense mat of black setae which continue not very far round to the under side; there is a raised centre portion of the margin also densely covered with black setae. Side-pieces of the ninth segment triangular with acute apices; superior appendages from behind, ear-shaped, margins fringed with long black hairs; from the side, deep and narrow, apical margin concave, distinguishing the species from *himalayanus* in which the margin is convex; between these appendages, seen from behind, are the intermediate appendages broad at the base with narrow, pointed yellowish apices directed upwards and placed side by side; from the side, the base of the appendage projects nearly at right-angles; penis short and stout, apex from behind excised; lower penis-cover trough-shaped, set close beneath the penis; penis-sheaths with broad membranous bases and narrow strongly chitinised terminal portions bent inwards horizontally, apices furnished with stiff bristles; inferior appendages small and broad, margins fringed with long hairs and bearing slight projections towards the inner angles as seen from beneath; from the side, broad at the base, apex produced in a small blunt finger.

Length of anterior wing ♂ 21 mm.

Tibet; Yatung, 4,500 ft., A. E. Hobson,



Pseudostenophylax martynovi sp.n., ♂. Fig. 1, wings. Fig. 2, anal area of left posterior wing showing scales, enlarged. Fig. 3, genitalia, lateral. Fig. 4, apex of intermediate appendage, lateral. Fig. 5, genitalia, from behind. Fig. 6, inferior appendages, penis and lower penis-cover, etc., ventral.



Pseudostenophylax himalayanus Mart., ♂. Fig. 1, wings. Fig. 2, portion of right posterior wing around A₂, enlarged. Fig. 3, genitalia, lateral.

Type ♂ in the British Museum collection, abdomen mounted in balsam.

***Pseudostenophylax himalayanus* Martynov** (Text-figs. 4-5;
Pl. VI, figs. 1-3).

Pseudostenophylax himalayanus Mart. *partim*.—Proc. Zool. Soc. London, Pt. I, No. 6, pp. 92-5 but not figs. 38-41.

Head dark ochraceous; antennae, basal joint yellowish, remainder still paler with no apparent annulations, palpi and legs ochraceous. Wings, anterior, broad, rounded at the apices, membrane yellowish, granulose with short semi-erect yellowish hairs with rather larger blackish hairs in the sub-costal area darkening the base of the wing in this region; costa fringed with very short adpressed black hairs. The wing is irrorated, particularly in the post-costal region with round yellowish spots. Posterior wing yellowish, finely granulose with a dense row of thick whitish scales clothing the second anal vein to the margin of the wing. The basal portion of the wing is not so deep in proportion to its length as in the preceding species, *martynovi*.

Genitalia ♂.—Points of difference between the genitalia of *himalayanus* and *martynovi* few, and are as follows:—

There is no raised upper portion of the setae-clad margin of the eighth dorsal segment; superior appendages from the side with the outer margins convex instead of concave; the terminal portions of the penis-sheaths much broader; inferior appendages from the side, rounded, the apices are not acute as in *martynovi*.

Length of anterior wing ♂ 20 mm.

Tibet: Yatung, 4,500 ft., A. E. Hobson.

Type ♂ with the abdomen mounted in balsam, in the collection of the British Museum.

In the course of the examination of the examples of *P. himalayanus* in the British Museum collection for the purposes of this revision, it was discovered that the two ♂ examples collected by A. E. Hobson in Tibet, remaining in the British Museum, represented two distinct species.

In the light of the discovery, it became apparent that Martynov's description of the wings, more particularly of the posterior wing with its provision of scales 'in a dense row' clothing the vein A_2 , referred to the one species but his figures of the genitalia, to the other. This is clearly evidenced by the concave outer margin of the superior appendage as seen from the side.

As the more important characters separating the two species are to be found in neuration, particularly the arrangement of the scales on the posterior wing, I have fixed the type of *himalayanus* as the species bearing the dense row of thick whitish scales. Martynov's figures of the genitalia (figs. 38-41, Proc. Zool. Lond., p. 93, 1930) agree perfectly with mine from the cleared abdomen of *martynovi*.

With regard to the ♀♀, it is impossible to say with certainty, with which species they should be associated and I therefore abstain from including descriptions here.

Pseudostenophylax griseolus Mart. (Pl. VII, figs. 1-4).

Pseudostenophylax griseolus Mart.—Proc. Zool. Soc. Lond., Pt. I, No. 7, pp. 97-8, 1930.

♀ Head reddish-brown above, testaceous in front; ocelli large, whitish; antennae brown, with distinct pale annulations; palpi testaceous. Thorax reddish-brown above, metanotum paler; underside of the thorax reddish-yellow. Legs yellow with black spines; spurs 1, 3, 3 yellow; on anterior tibiae some brownish spots around groups of spines; anterior tarsi also brownish. Anterior wings rather narrow with apical margin rounded; membrane granulose with minute hairs; pale brownish-grey irrorated with numerous small round hyaline spots; costal and sub-costal areas greyish-yellow; dorsal portion behind *Cu* brown, with distinct hyaline spots. *DC* very long, first apical fork impinging only slightly further inward than the second; cross vein *rs-m* equal to *irs* but oblique. Posterior wings sub-hyaline, minutely granulose and hairy; first apical fork impinging not further inward than the second. Abdomen dark brown, ochraceous beneath. Ninth segment rather broad in dorsal part, ventral portion projecting considerably backward and rounded if seen from the side. Sub-genital apparatus composed of a very small median-lobe and two large pale testaceous side-lobes, concave on their inner posterior margins. Superior appendages fused with tenth segment, hairy, triangular as seen from above, united at their bases, apices produced in two slender stick-shaped processes. Side-lobes of tenth segment rounded in profile, broadly divided by a median excision beneath.

Length of body 8 mm. Expanse 27-28 mm.

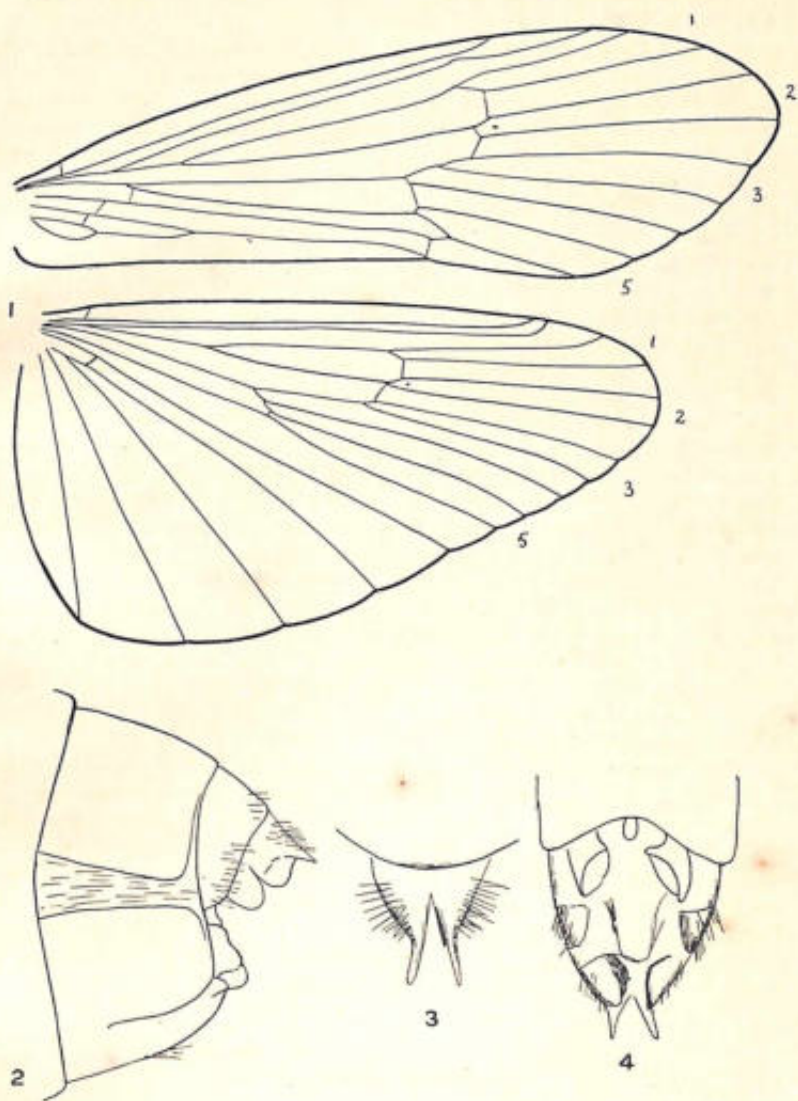
♂ ♀ Sikkim: Khamba Jong, 15,000-16,000 ft., 15-30-vii-1903, Tibet Expedition, Lt.-Col. H. J. Walton.

The above is Martynov's description with reproduction of his figures. I am opposed to the description of new species from female types and have not therefore re-described and re-figured the species myself. I am inclined to the opinion that, having regard to the spur formula 1, 3, 3 and the shape of the posterior wing which is not perceptibly excised beneath the apex as in *Pseudostenophylax* species, *griseolus* might be better placed in the genus *Pseudohalesus*; in the absence of the male, I am not prepared to make a definite pronouncement.

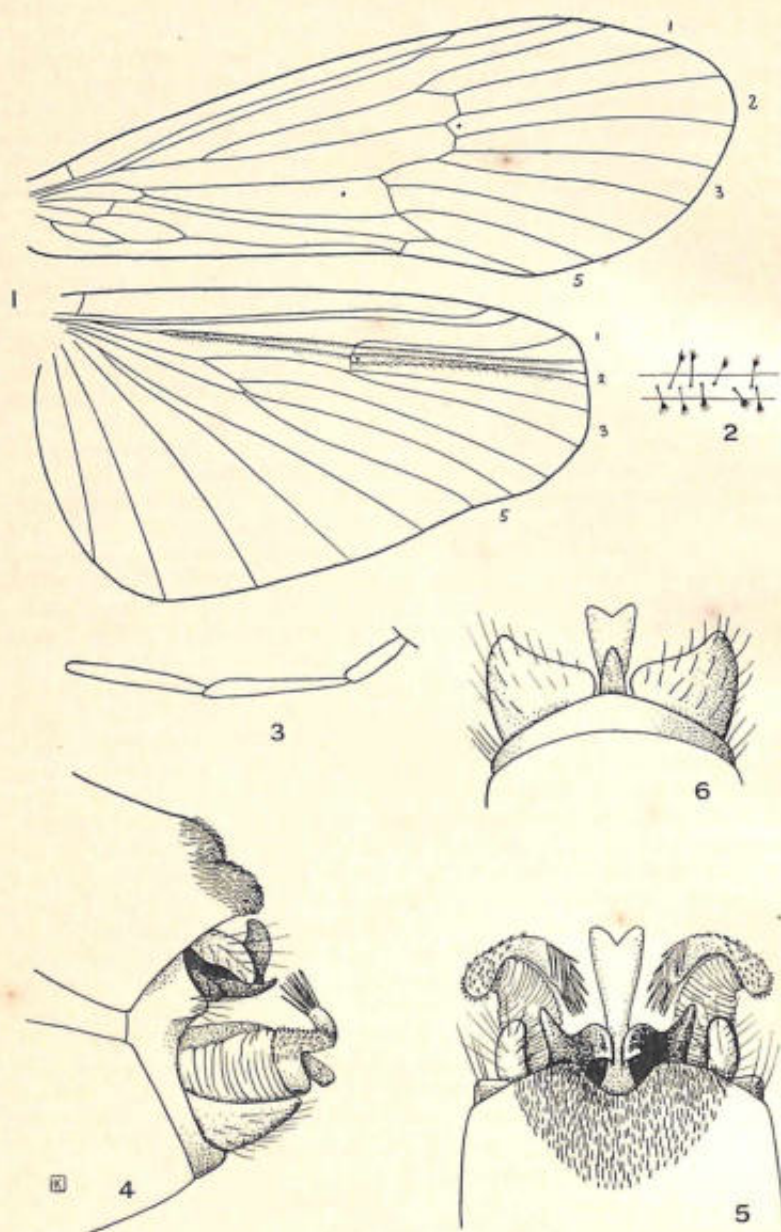
Astenophylodes gen. n.

This genus may be separated from the nearly related *Pseudostenophylax* partly by the presence of spines on the terminal tarsal joint but mainly by the structure of the posterior wing.

Anterior wings rather elongate, apices sub-acute, discoidal cell long and narrow; posterior wing, discoidal cell long and reduced in width to dimensions quite unknown in any other recorded *Limnophilid* genus; the two branches of the sector enclosing this



Pseudostenophylax griseolus Mart., ♀. Fig. 1, wings. Fig. 2, genitalia, lateral. Fig. 3, dorsal. Fig. 4, ventral (genitalia after Martynov).



Astenophylodes burmanus sp.n., ♂. Fig. 1, wings. Fig. 2, specialised hairs of posterior wing, enlarged. Fig. 3, maxillary palpus. Fig. 4, genitalia, lateral. Fig. 5, dorsal. Fig. 6, inferior appendages, penis and lower penis-cover, etc., ventral.

cell as also the second, third and fourth apical sectors carry rows of peculiarly formed scales each set on a long foot-stalk with a dilated head somewhat of the pattern of the *Lepidopterous battledor* scales. Forks Nos. 1, 2, 3 and 5 in both anterior and posterior wings present. Antennae rather slender, nearly as long as the anterior wing, basal joint large and dilated on its inner margin, adjacent joint very short and the next more than twice as long and longer than each of the remaining joints. Maxillary palpi ♂, basal joint about half the length of the second which is as long as or slightly longer than the third. Spurs 1, 3, 4.

Genotype: *Astenophylodes burmanus* sp. n.

***Astenophylodes burmanus* sp. n.** (Pl. VIII, figs. 1-6).

Head dark fulvous; ocelli greenish-yellow; antennae, basal joint ochraceous, remaining joints fulvous with ochraceous annulations; palpi ochraceous; mesothorax fulvous with large, nearly black lateral markings.

Wings, anterior, dark fulvous with numerous yellowish irroration, veins dark ochraceous, membrane granulose with innumerable short erect black setae, post-costal area beset with longish recumbent black hairs so that the wing is considerably darkened in this area; narrow darkened borders to the apical veins giving the wings a somewhat striate appearance; posterior wing also granulose, for the rest, as detailed in the generic description. Legs ochraceous with dark patches at the bases of each tarsal joint, spines black.

Genitalia ♂.—Margin of the eighth dorsal segment rounded, set with dense black setae to a considerable depth and with a deep semicircular excision at its centre; superior appendages short and yellowish furnished with rather long hairs particularly along the inner margins; intermediate appendages very strongly chitinised with bifurcate blackened apices, outer forks long and slender, inner wide and rounded as seen from above; from the side the inner fork has an outer convex margin and is directed upward and slightly backward; outer fork slender and directed backward; there is a small rounded lobe at the base of each appendage on its outer side; side-pieces of the ninth segment somewhat produced and triangular, set with long hairs; penis long and straight, apex dilated and widely excised; lower penis-cover strongly chitinised, narrow and tapering to a point; penis-sheaths membranous, from above, the apical extremities curved and lying transversely across the basal stem, outer ends of these transverse portions rounded and set with short teeth, inner ends with long stiff bristles; inferior appendages from beneath, short and broad, apices obliquely truncate, outer angles produced; margin of the ninth ventral segment produced at its centre.

Length of anterior wing ♂ 16 mm.

♀ unknown.

Burma 28°N., 97° 24'E., 11,000 ft., 29-vi-1926, F. Kingdon Ward.

Type ♂ in the British Museum collection, abdomen mounted in balsam.

Stenophylina Mosely.

Stenophylina Mosely.—Entom., lxi, p. 13, 1936.

Maxillary palpi with the basal joint about half the length of the second which is equal to the third; antennae long and stout, basal joint large and rounded, next joint very short, third longer, about two-thirds the length of the basal joint and longer than the following joints. Anterior wings broad, costal margin rounded, radius bent towards its apex nearly to meet the sub-costa; forks Nos. 1, 2, 3 and 5 present, all sessile; discoidal cell long and narrow; cellula thyridii long and narrow, extending towards the base beyond the cross-vein joining the cubitus and the first anal vein.

Posterior wing with forks Nos. 1, 2, 3 and 5, all sessile; there is a well-developed frenulum situated on the basal half of the costa, consisting of very long fine hairs; anal area produced in a large triangle; discoidal cell long and narrow.

Spurs 1, 3, 4. For genital characters, reference should be made to the description of the single species *mitchelli*.

Genotype: *Stenophylina mitchelli* sp. n.

The genus is evidently related to Martynov's *Pseudostenophylax* having regard to the genitalia, but the posterior wing lacks the specialised hairs or scales which is so characteristic of that genus.

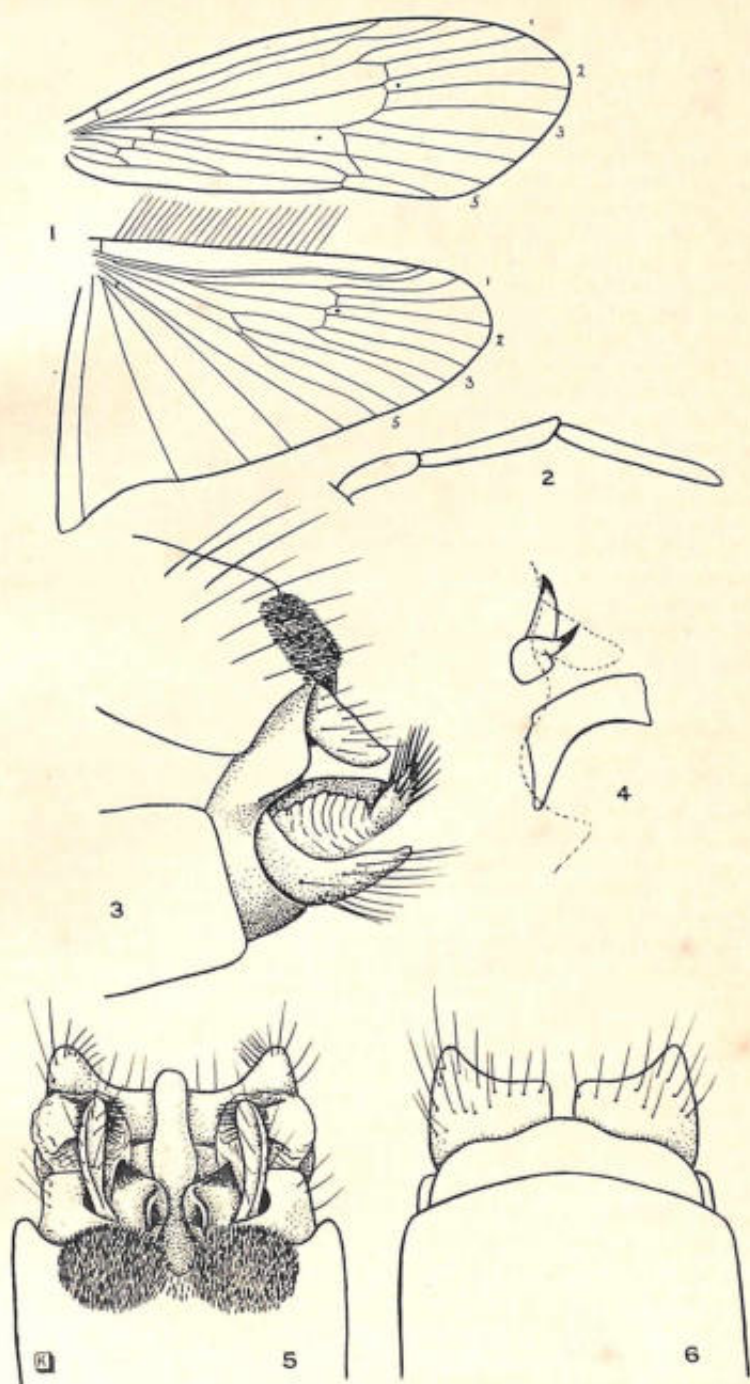
Stenophylina mitchelli Mosely (Pl. IX, figs. 1-6).

Stenophylina mitchelli Mosely.—Entom., lxi, pp. 13-14, 1936.

The two examples of this species are both mounted as balsam preparations. The wings are large and brown and the insects bear a general resemblance to species of the genus *Pseudostenophylax* but the costal margin of the anterior wing is far more rounded and the very extraordinary development of the anal region of the posterior wing renders this insect amply distinct from the *Pseudostenophylax* species. The general characters are given in the description of the genus.

Genitalia ♂.—The margin of the terminal dorsal segment is produced at its centre in two large rounded lobes closely set with minute black setae and with a deep excision between; superior appendages small and narrow; intermediate appendages from above broad and triangular, inner angles produced in strong black teeth directed upwards, apical angles also blackened; from the side, the apical angle appears as a short, slightly curved spur and the inner angle as a well-developed and much larger black upwardly-directed tooth. Penis from above, long, dilated slightly at the centre, apex rounded; from the side it curves slightly downward with a truncate apex. Penis-sheaths long and membranous, apices furnished with long bristles or teeth. Inferior appendages very broad, nearly quadrangular, apices truncate with the outer apical angles slightly produced; from the side the appendage is rather narrow with a concave upper margin and acute apex; the margin of the terminal ventral segment produced slightly at its centre.

Length of anterior wing ♂ 16 mm.



Stenophytina mitchelli sp.n., ♂. Fig. 1, wings. Fig. 2, maxillary palpus. Fig. 3, genitalia, lateral. Fig. 4, intermediate appendages and penis, lateral. Fig. 5, genitalia, dorsal. Fig. 6, inferior appendages, etc., ventral.

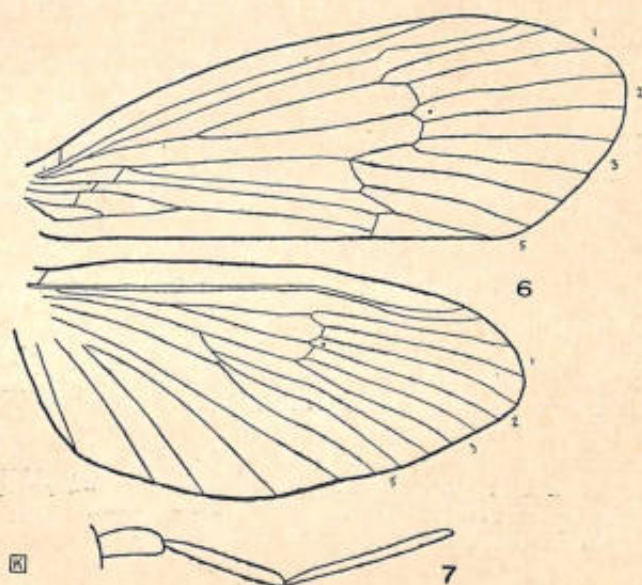
Kashmir: Lake Vishensar 12,000 ft., F. J. Mitchell.

Type ♂ and paratype ♂ in the author's collection, both mounted as balsam preparations, one pair of wings of the type mounted dry.

I dedicate this species to the memory of the late F. J. Mitchell to whom is due the introduction of trout into Indian waters and who took a keen interest in the entomology of Kashmir in its relationship to trout food.

Trichophylax gen. n. (Text-figs. 6-7).

Antennae broken away at the second basal joints in the unique example; basal joint long, second joint very short; maxillary palpi ♂, basal joint short, stout, about half the length of the second,



Figs. 6-7. *Trichophylax rotundipennis* sp.n., Fig. 6, wings ♂. Fig. 7, maxillary palpus ♂.

third nearly half as long again as the second. Anterior wing, membrane granulose with erect black hairs particularly along the veins, apex broad and rounded, costa rounded; posterior wing only slightly broader than the anterior, also granulose with very small erect hairs; discoidal cell long in both wings. Spurs 1, 3, 4 (?), rather difficult to make out in the single example. Dorsal segments of the abdomen bearing long fine silky hairs. Genitalia conforming to the general pattern of the *Pseudostenophylax* group.

Genotype: *Trichophylax rotundipennis* sp. n.

This is the first Trichopteron I have seen with an abdomen provided with long fine hairs along the dorsal segments.

Trichophylax rotundipennis sp. n. (Pl. X, figs. 1-3).

Head dark fulvous, paler next to the ocelli; antennae, palpi and legs fulvous. Other characters are given with the generic description.

Genitalia ♂.—The margin of the eighth dorsal segment bears at its centre a mat of unusually coarse black setae, the centre itself is produced and elevated so that the setae appear more dense in this region; superior appendages from above, short and slender, curving inwards and fringed with long hairs; from the side, broad at the base and tapering to a rounded apex; intermediate appendages from above appear as ear-shaped processes with blackened rims curving upwards at their inner and still more blackened margins; from the side the appendage appears as an upwardly directed rather stout process. Penis short and straight with a collar below the apex; penis-sheaths strongly developed with dilated triangular apical parts fringed with stout bristles and with the upper and lower apical angles bent sharply inward; inferior appendages short and broad, each with a short slender process arising from the interior margin towards the inner angle; the margins of the eighth and ninth ventral segments produced at their centres; there is a patch of short bristles on the eighth sternite towards the centre of its margin.

Length of anterior wing ♂ 16 mm.

Punjab: Murree, 6-ix-86. 46-83.

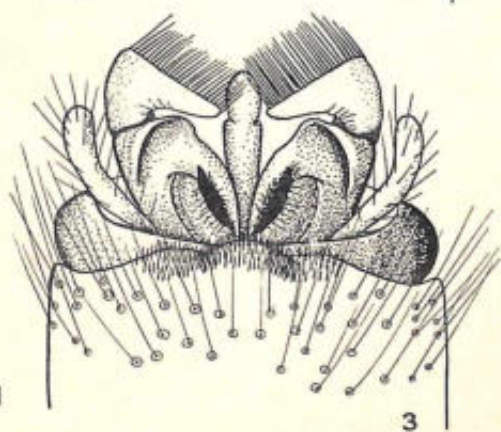
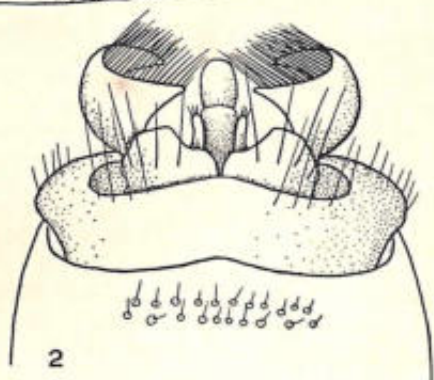
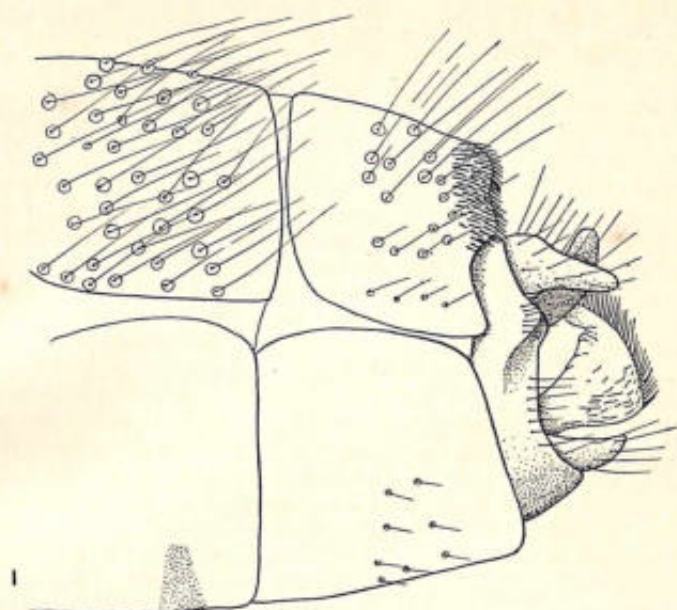
Type ♂, with the abdomen mounted in balsam, in the British Museum collection.

This species was found in the British Museum collection over the name *Stenophylax micraulax* McL. It is evident however that it has been wrongly determined. *S. micraulax*, as described by McLachlan, is characterised by a groove along the costal margin of the anterior wings, filled with black hairs and should therefore be placed in Martynov's genus *Pseudohalesus* (and not in *Pseudostenophylax* as Martynov suggests in Ann. Mus. Zool. Ac., 1927 and again in the Proc. Zool. Soc. Lond., 1930).

Pseudohalesus Martynov.

Pseudohalesus Martynov.—Ann. Mus. Zool. Acad. Sci. U.S.S.R., vol. xxviii, pp. 480-1, 1927.

Antennae rather short, basal joint bulbous, next joint very short, the next about three times longer and about twice as long as the following joints. Maxillary palpi of the ♂ with the basal joint very short, second and third long and equal; ♀, basal joint half the length of the second, third slightly longer than the second, fourth as long as the second, fifth slightly longer than the fourth. Anterior wings brownish, usually obliquely truncate at their apices, membrane granular with numerous semi-erect, very short black hairs, rather longer along the veins; along the costal margin towards the base is a narrow fold filled with short black specialised hairs; the posterior wings are without the specialised hairs or



Trichophylax rotundipennis sp.n., ♂. Fig. 1, terminal abdominal segments and genitalia, lateral. Fig. 2, ventral. Fig. 3, dorsal.

scales found in *Pseudostenophylax*, membrane rather more granulose than usual and, as in the anterior, carrying numerous semi-erect hairs but smaller and less dense than in that wing; discoidal cell in both wings long. Legs, first joint of the anterior tarsus long, carrying a mat of short black setae along its under surface, spines black, few in number and absent on the terminal tarsal joint; spurs 1, 3, 3.

Genotype: *Pseudohalesus asiaticus* Ulmer.

***Pseudohalesus kaschmirus* Mart. (Text-fig. 8).**

Pseudohalesus kaschmirus Mart.—Ann. Mus. Zool. Acad. Sci. U.R.S.S., xxviii, Pt. I, pp. 481-2, Pl. XXV, figs. 1-3, 1927.

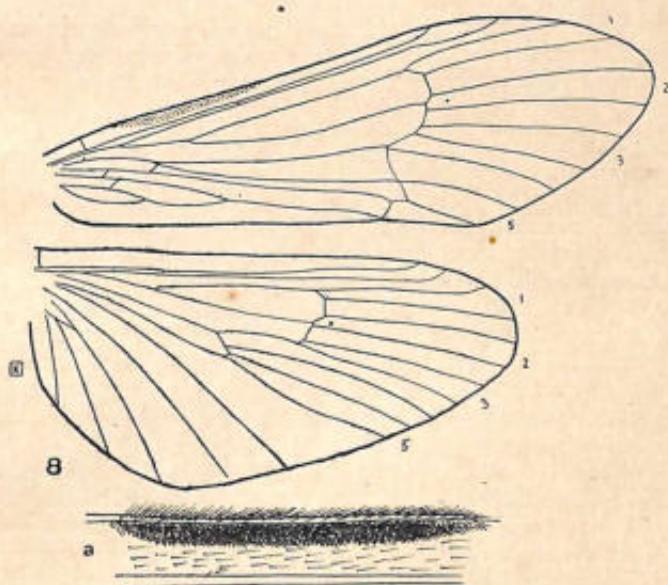


Fig. 8. *Pseudohalesus kaschmirus* Mart., wings ♂. 8A. costal area of anterior wing more enlarged.

This species is to be distinguished from *P. aberrans* only by its neurulation and size. I have been able to find no satisfactory distinctions in the genitalia by which to separate the two species.

On a comparison of the figures of the wings of the two insects, it will be noticed that in both anterior and posterior, fork No. 1 is of normal width in *kaschmirus* and exceptionally narrow in *aberrans*; in the former species, fork No. 3 is present in both wings, in the latter, generally absent, in occasional examples present perhaps only in one wing and then unusually narrow.

Length of anterior wing ♂ 15 mm.

Western Tibet: Chagra, 15,215 ft., 4-vii-1932, G. E. Hutchinson, Yale North India Expedition; Kashmir, 7-8-vi-1910.

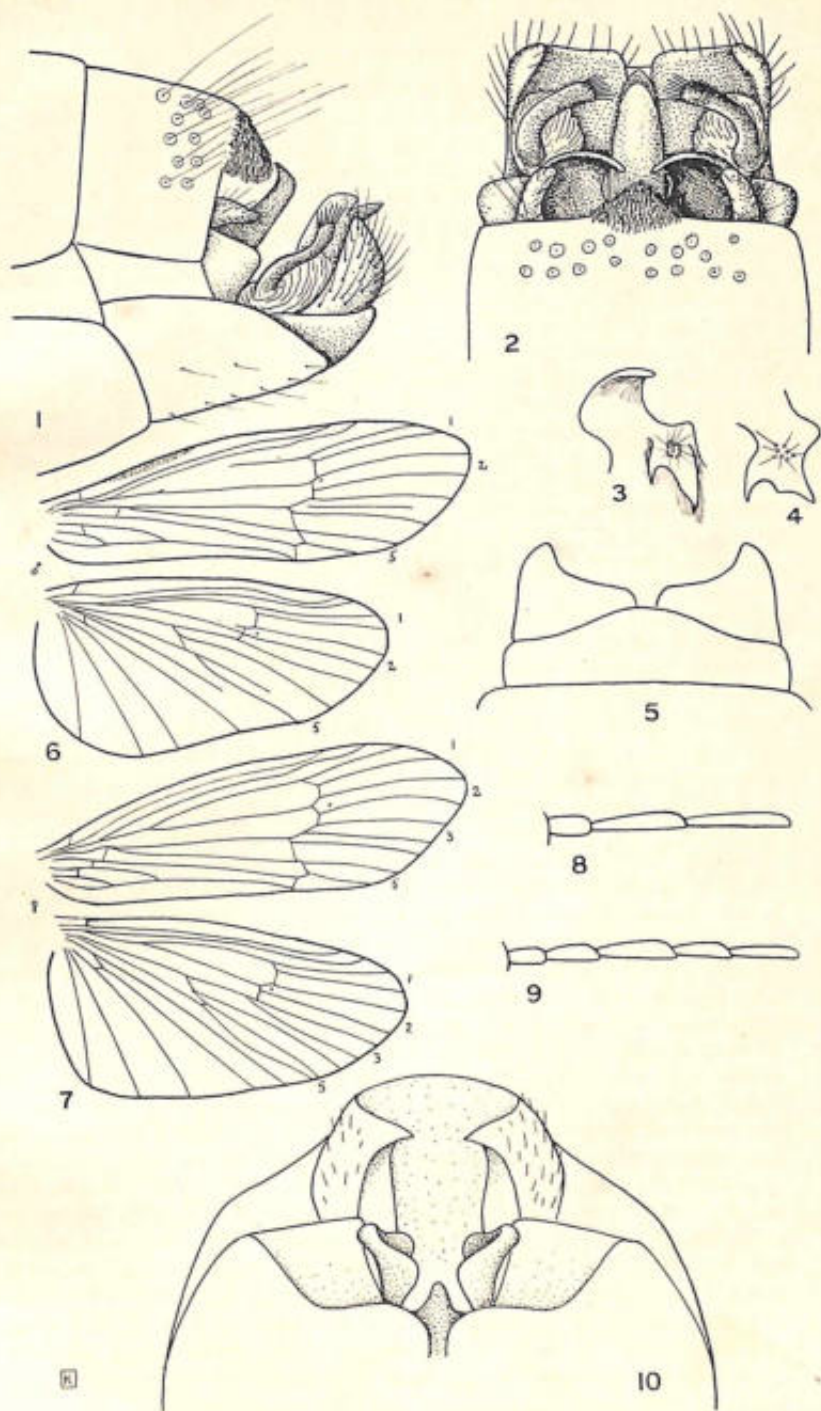
Pseudohalesus aberrans sp. n. (Pl. XI, figs. 1-10).

Head dark fulvous; ocelli white and rather prominent; antennae fulvous with paler annulations; palpi and legs pale fulvous. Anterior wings warm fulvous with yellowish irrorations more numerous in the post-costal region, membrane granulose, set with black erect hairs very long on the veins and closer together and more recumbent in the post-costal region so that the wing is considerably darkened in this area; in the ♂ there is a groove along the costa towards the base filled with specialised black hairs as indicated in the generic description; in this sex also the anterior wings in each example of a series of four, show varying aberrations in neuration but all agree in the absence of fork No. 3 which is absent also in the wings of one of the females represented but present in those of the other; other aberrations are too variable for description and consist mainly of broken nervures, in particular the sector so that in several examples (♂), the discoidal cell is only partially enclosed, the upper basal margin being wanting; membrane of the posterior wings weakly granulose with short but much less conspicuous black or brownish hairs than on the anterior wings. Fork No. 3 sometimes present, sometimes absent.

Genitalia ♂.—Margin of the eighth dorsal segment which is produced in a black tongue towards the centre, closely set with a mass of short black setae which form a mat, not only on the tongue but also over a considerable area beneath it; superior appendages from above, very small and narrow, curving slightly inward and fringed with long hairs; intermediate appendages somewhat complex and varying in detail in individuals; there is a pair of broad plates, as seen practically from behind, set side by side with the inner margins deeply concave so that between the two there is a nearly circular excision, inner apical angles slightly produced and turned over, from the side, directed upward; these plates form the bases for processes which are concealed by the dorsal segment and can only be seen directly from behind; they arise from towards the inner angles of the bases of the plates and are strongly chitinised and blackened; they vary in shape in individuals as indicated in the figures but agree in having small warts covered with long hairs at their bases; penis short and straight, sheaths membranous, no doubt extensile to judge by the creases in the membranes, apices set with long bristles; inferior appendages very broad, apices sinuous, nearly truncate, outer angles slightly produced.

Genitalia ♀.—The structure is only visible from directly behind; the ninth segment is produced at the centre of its lateral margins in two acute triangles directed inwards; below this is the vulvar scale with a pair of leaf-like, rather broad and sinuous lateral processes with a very small central lobe between. In both sexes the margin of each ventral segment carries a pair of nearly parallel rows of bristles separated from each other slightly towards their centres to enclose a narrow clear space (excepting the eighth where the bristles are closer together).

Length of anterior wing ♂ 10-12 mm.



Pseudohalesus aberrans sp.n., Fig. 1, genitalia ♂, lateral. Fig. 2, dorsal. Fig. 3, intermediate appendage, dorsal. Fig. 4, basal plate of the appendage from another specimen. Fig. 5, inferior appendages, etc., from beneath. Fig. 6, wings ♂. Fig. 7, wings ♀. Fig. 8, maxillary palpus ♂. Fig. 9, ♀. Fig. 10, genitalia ♀, ventral.

Length of anterior wing ♀ 11 mm.

Western Tibet; Kyam, about 15,500 ft., 19-25-vii-1932, C. E. Hutchinson, Yale North India Expedition.

Type ♂ in the British Museum collection, mounted in balsam, one pair of wings dry. Paratypes ♂♂, ♀♀ from the same locality in the British Museum and Yale University collections.

All the species of the series were found dead under stones. This is a strange insect and I can find no satisfactory variation in genitalia on which alone to separate the species from *P. kaschmirus* Martynov. Had I been confronted with a single example, I should unhesitatingly have considered it as merely an aberrant dwarfed form of this species. But having regard to the fact that Mr. Hutchinson obtained a series of no less than six examples, it is impossible to believe that in nearly all, a mere aberration could take the same form, i.e., the absence of fork No. 3 in both wings.

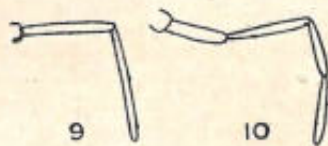
Halesinus Ulmer (Text-figs. 9-10).

Halesinus Ulmer.—Notes Leyden Mus., xxix, No. 1, pp. 3-4, fig. 3, 1907; Gen. Insect., fasc. 60a, pp. 57-8, Pl. V. fig. 38, 1907.

The genus *Halesinus* was erected by Ulmer to take a single ♀ species *tenuicornis* and the generic characters have been selected in accordance with the characters of this ♀. Subsequently Martynov described another ♀, *ussuriensis*.

The first ♂ to be recorded was found in the collection of the British Museum, from Tibet, and described by Martynov, in 1930, in the Proc. Zool. Soc. Lond., under the name *albipunctatus*.

Martynov described both sexes but does not figure the ♂ wings nor extend the generic description to cover this sex.



Figs. 9-10. *Halesinus albipunctatus* Mart., Fig. 9, maxillary palpus ♂. Fig. 10, maxillary palpus ♀.

When, for the purposes of this revision I found it necessary to prepare figures of the ♂ wings, it became apparent that the neurulation of the ♂ is abnormal, and that the genus must be considered as exceptional as is the case with *Thamastes*, *Anomalopteryx* and *Enoicyla*.

The characters given below are based on those selected by Ulmer and refer to the ♀ sex alone, with the exception of the spurs which are 1, 3, 3 in both sexes.

Head very short and broad with a pair of transverse warts towards the back and a pair of small rounded warts between these and the lateral ocelli; antennae generally thin, as long as

the anterior wing, the basal joint thicker and longer than the following ones and longer than the head; maxillary palpi very long and fine, first joint short, second equal to the fourth, the third somewhat longer, as long or even longer than the fifth; legs thin and long, with the spurs 1, 3, 3 inner spur slightly longer than the outer, spines black; first joint of the fore-tarsus as long as the second and third joints together. Anterior wing thickly clothed with hair and with the apex dilated, the apical border undulating so that the margin is concave in the fourth, fifth and sixth apical cells, the fringe at these points being comparatively long; neuration of the ♀ regular, forks Nos. 1, 2, 3 and 5 present; radius bent slightly before its extremity; discoidal cell very long and narrow, about three times as long as its foot-stalk, its upper and lower margins nearly straight; fourth apical cell closed by a straight nervure which is slightly longer than that of the second. Posterior wing only slightly broader than the forewing, discoidal cell much shorter than that of the forewing; only 8 apical veins present instead of the usual nine, the sixth apical vein being missing so that only forks Nos. 1, 2 and 5 are present; fourth apical cell as in the anterior wings.

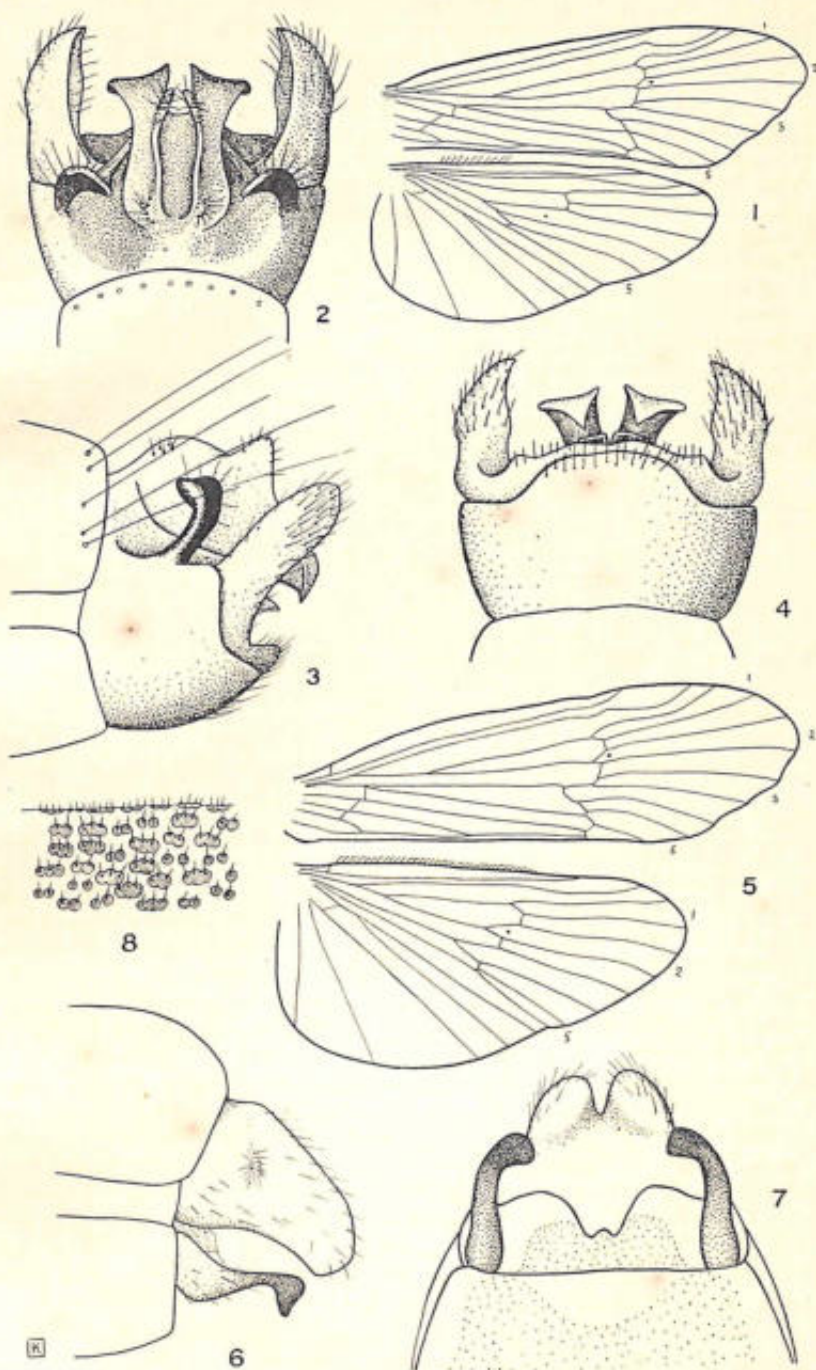
It may be added, with reference to the male, that in the posterior wing the discoidal cell is wanting, only fork No. 5 is present and that the first joint of the maxillary palpus is very minute. It cannot be made out at all in the type of *albipunctatus* in the British Museum, but Mr. Martynov (*in litt*) states that 'in the ♂ of *H. ussuriensis* there are three joints of which the basal is very short although distinct'.

Halesinus albipunctatus Mart. (Text-figs. 9-10; Pl. XII, figs. 1-8).

Halesinus albipunctatus Martynov.—Proc. Zool. Soc. Lond., Pt. I, No. 7, pp. 98-100, figs. 52-6, 1930.

Head black with slender black antennae; mesonotum black with the median impressed portion reddish-brown; metanotum dark brown. Maxillary palpi ♂ basal joint very short, second and third joints long and thin, approximately equal in length. Legs yellowish-brown; tarsi somewhat blackish externally. Anterior wing dilated towards the apex the margin of which is obliquely truncate, and distinctly undulating so that it is concave in the fourth, fifth and sixth apical cellules; membrane brown, clothed with blackish hairs; there are several pale yellow rounded spots particularly in the costal and sub-costal areas and two oblique pale spots between the cubitus and the hind margin and also two round yellowish spots at the arculus; fringe long with whitish spots here and there; discoidal cell long; posterior wing ♀ smoky, with a long discoidal cell; neuration of the male posterior wings abnormal as may be seen in the figure; there is a well-developed frenulum in both sexes, an unusual feature in the *Limnophilidae*.

Genitalia ♂.—Margin of the eighth dorsal segment fringed with long stout hairs; from above, beyond it is a large bifurcate dorsal plate with a narrowish cleft between the two forks, the sides of the cleft standing up in two sharp ridges of which the



Halesinus albipunctatus Mart., Fig. 1, wings ♂. Fig. 2, genitalia ♂, dorsal. Fig. 3, lateral. Fig. 4, ventral. Fig. 5, wings ♀. Fig. 6, genitalia ♀, lateral. Fig. 7, ventral. Fig. 8, portion of penultimate ventral segment ♀, enlarged.

distal ends are abruptly elevated in a pair of triangular processes; beyond the cleft, the plate slopes sharply downward and each fork terminates in a broadened truncate apex, apical angles projecting beyond the sides of the fork; on each side of the dorsal plate there is a large, strongly chitinised blackened curved hook, as seen from the side, directed upward with the apex slightly forward; penis retracted and difficult to make out; lower penis-cover broad, with excised apex which, seen from beneath appears as a pair of broad, shallow, truncated lobes; inferior appendages single-jointed; from the side, rather broad and straight, directed upward; from above, outer margins convex, inner straight or slightly sinuous, apices acute; from beneath, they are widely separated but connected at their bases by a strongly chitinised plate with a sinuous apical margin; margin of the ninth ventral segment strongly produced and rounded at its centre.

Genitalia ♀.—From above, the ninth dorsal segment terminates in two triangular processes separated from each other by a narrow cleft, each with a rounded wart at its base; from the side, they are very broad at the base, upper margins convex, lower sinuous, apices directed downwards; the margins of these processes and also the warts are rather densely fringed with long hairs; on each side of the central triangular processes are rather short, strongly chitinised caliper-like branches which, from beneath, terminate in clavate apices; from the side, each of these branches has the appearance of a duck's head, neck and shoulders directed downward; there is a ventral plate with a deeply cleft apical margin and a small central lobe, no doubt representing the vulvar scale; along the margin of the penultimate ventral segment there is a deep band of minute black setae arranged in groups of twos and threes to make a close pattern.

Length of anterior wing ♂ 11 mm.

Length of anterior wing ♀ 12 mm.

Tibet; Yatung. A. E. Hobson.

Type ♂ and ♀ paratypes ♀ ♀ in the British Museum.

Platyphylax McLach.

Platyphylax McLach.—Journ. Linn. Soc. Zool., xi, p. 109, 1871; Rev. and Syn. Trich., p. 143, 1875; Ulmer.—Gen. Insect., fasc. 60a, pp. 53-4, 1907.

Spurs 1, 2, 2, ♂ ♀. First joint of the anterior tarsi long in both sexes. Palpi and legs slender (typically). Form of wings and general appearance much as in *Stenophylax* or *Halesus* (typically); anterior wings shining with scarcely any pubescence on the membrane (typically). Male with long up-directed inferior and broadly rounded superior appendages. The apex of the abdomen very obtuse, without appendages.

The above is McLachlan's description of the generic characters but he adds 'The Chinese *P. lanuginosus* and numerous North American species are widely divergent and in a general work on the species of the world it would be necessary to place them in several genera'.

Martynov's *rufescens*, a ♀, and the only described Indian species, hardly conforms to the generic characters, but until the Indian species of this genus are better known, particularly the males, it would be premature to extend the characters to cover this one case.

Genotype: *Platyphylax frauenfeldi* Brauer.

Platyphylax rufescens Martynov (Pl. XIII, figs. 1-5).

Platyphylax rufescens Martynov.—Proc. Zool. Soc. Lond., Pt. I, No. 7, pp. 105-6, figs. 64-6, 1930.

The type of this species is a ♀ of which Martynov's description is as follows:—

'Head and thorax yellowish-rufous with concolorous hairs. Antennae and palpi also yellowish-rufous. Legs yellow with few black spines; spurs yellowish-rufous 1, 2, 2. Anterior wings with parabolic apical margin, membrane finely granulose clothed with short yellowish hairs; fringe concolorous, yellowish without markings; post-costal area slightly brownish, irrorated with indistinct hyaline spots. Discoidal cell long, somewhat dilated at the end; first and third forks triangular, not deeply impinging inwards. Nervures pale testaceous. Posterior wings yellowish, sub-hyaline. Neuration resembling that in the anterior wings; fourth apical cell closed basally by an oblique nervure as in the anterior wings. Discoidal cell very long. Abdomen pale reddish-yellow, seventh, eighth and ninth segments brownish. Eighth segment normal, large; eighth sternite with a deep excision, side borders of which are sinuous; behind the sternite is small oval lobe and in the distal portion of the excision two minute lobules. Ninth segment small, reduced, more or less fused above with the tenth segment and with the superior appendages, but lateral portions better developed, subquadrate beneath, hairy; dorsal portion of the ninth segment with a median excision as far as the base. *Appendices superiores* fused with the tenth segment but their edges discernible above; from above they are broad at the base with oblique outer margins; hind margins excised and each sub-divided into two small lobes. Tenth segment (fused with the superior appendages) forming two long stick-shaped processes above and a transverse short plate beneath.

Length of body 10 mm. Expanse 27 mm.

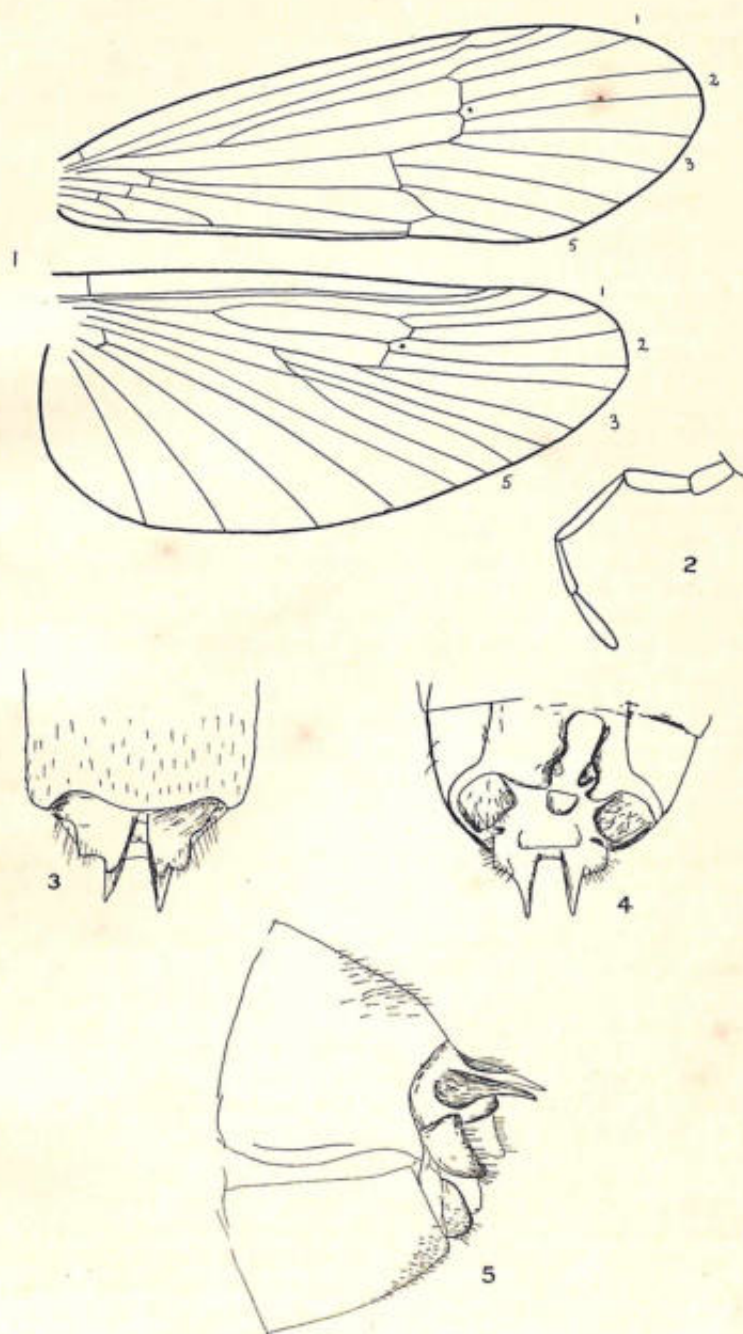
Tibet; Yatung, 4,500 ft., A. E. Hobson.

Type ♀ and paratype ♀ in the British Museum.'

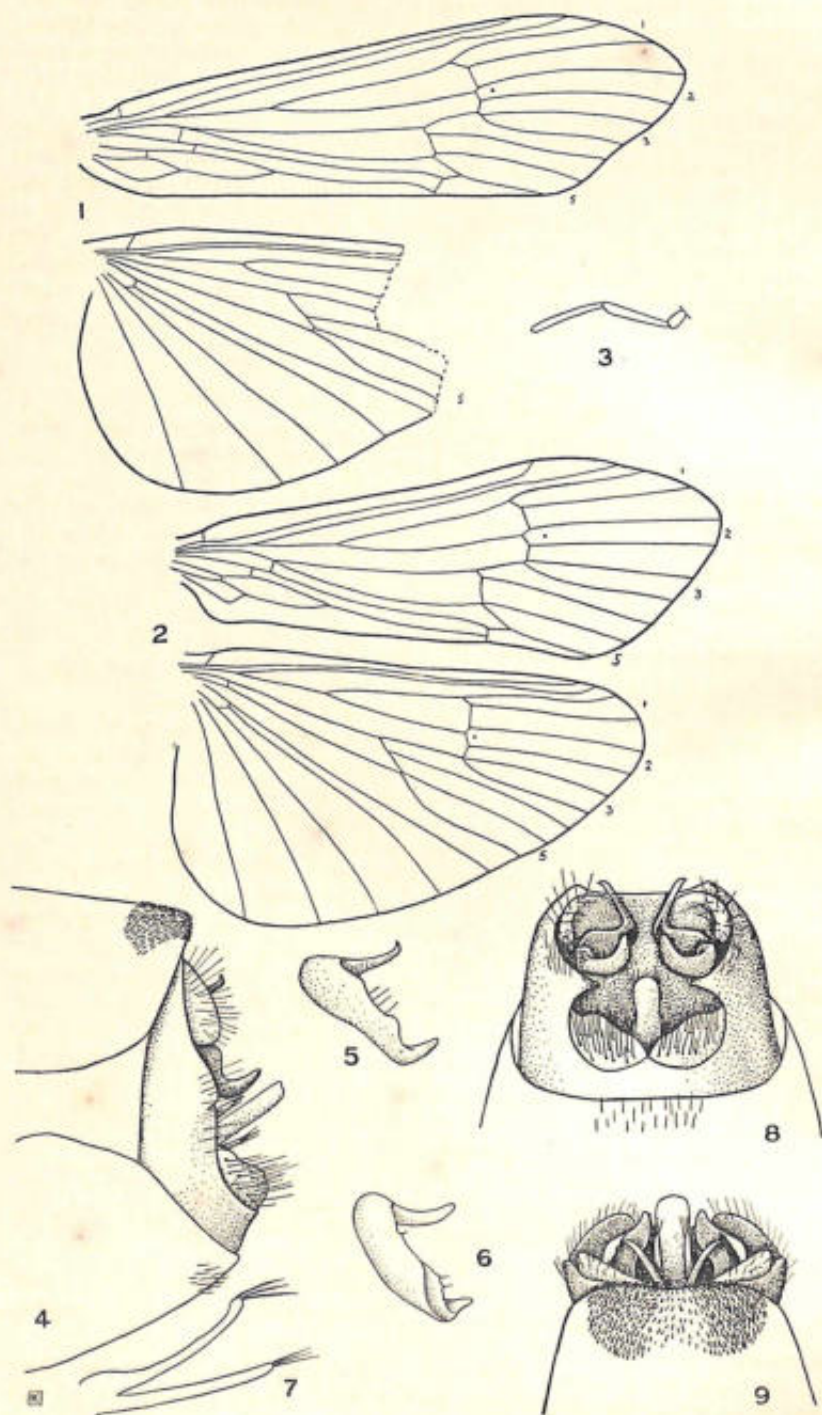
Phylostenax Mosely.

Phylostenax Mosely.—Entom., lxxviii, p. 184, 1935.

Insects large and brown, somewhat resembling *Pseudostenophylax* species but without the specialised scales of the posterior wing; anterior wing somewhat elongate, costal margin straight, apex only slightly dilated; in both wings second apical cellules very broad and forks No. 3 very acute at their bases; anterior wing, discoidal cell rather long and narrow, that of the posterior wing very broad at its distal end; shape somewhat different in



Platyphylax rufescens Mart., ♀. Fig. 1, wings. Fig. 2, maxillary palpus. Fig. 3, genitalia, dorsal. Fig. 4, ventral. Fig. 5, lateral (genitalia after Martynov).



Phylostenax himalus sp.n., ♂. Fig. 1, wings of type (Muktesar). Fig. 2, wings of a second specimen (Darjiling). Fig. 3, maxillary palpus. Fig. 4, genitalia, lateral. Fig. 5, intermediate appendage (Muktesar). Fig. 6, ditto (Darjiling). Fig. 7, a penis sheath, lateral (Darjiling). Fig. 8, genitalia, from beneath and behind. Fig. 9, genitalia, dorsal.

the example from Muktesar, but the wings in this insect are incomplete; membrane of the anterior wings scarcely granulose, brownish with numerous pale round irrorations; pubescence somewhat scanty but there is a mat of black hairs in each basal anal angle of the anterior wings.

Maxillary palpus male, first joint small, second and third long and approximately equal in length. Legs, terminal tarsal joints scantily furnished with black spines; genitalia, given in detail in the description of the genotype.

In the Muktesar insect the spurs are 1, 2, 2, but in the examples from Darjiling the legs are so broken that the spurs are uncertain. Three legs are gummed to the label, one showing three spurs, but these may perhaps have been detached from some other insect.

Genotype: *P. himalus* Mosely.

If the spurs alone were considered, *himalus* might perhaps be placed in *Platyphylax*, but McLachlan considered that the European species *P. frauenfeldi* was typical of the genus and that the ultra-European species would be better placed in other genera.

As I am also of opinion that the collection of many widely divergent forms of neurulation and genitalia in one genus tends to confuse rather than simplify classification, I prefer to create a new genus rather than overload an existing one.

Phylostenax himalus Mosely (Pl. XIV, figs. 1-9).

Phylostenax himalus Mosely.—Entom., lxxviii, p. 184, 1935.

General characters detailed in the generic description.

Genitalia ♂.—Margin of the eighth dorsal segment covered with small black setae which tend to group in two rounded masses towards the sides of the segment; superior appendages small and very wide, scarcely showing beyond the margin of the segment, from the side pear-shaped; the intermediate appendages are branched and the upper branches project beyond the margin of the segment, appearing as two divergent, rod-like processes; the lower branches are heavily chitinised and from above are rather widely separated, broad, inclining towards each other, apices wide and truncate, turned slightly upward with a strong ridge connecting the two apical angles; from beneath and slightly behind, they are strongly curved and direct upward; penis short and straight, furnished with a pair of forked sheaths whose apices are fringed with stiff bristles, the upper branch of each fork appearing above the penis and the lower, below; inferior appendages very small and wide, welded to the segment, on the eighth sternite, towards the centre is a tuft of fine spines.

Length of anterior wing ♂ 15 mm.

United Provinces; Kumaon, Muktesar, 7,000 ft., 24-iv-1923 to 15-v-1923, Fletcher coll.; Darjiling.

Type ♂ (Muktesar) in the collection of the British Museum. Paratypes, 2 ♂♂ Darjiling, in the collection of the Indian Museum, Calcutta.

The example from Muktesar differs slightly from the two examples from Darjiling both in the form of various parts of the

genitalia and also in the neuration, particularly in the form of the base of the discoidal cell in the posterior wing, wings much broken in the Muktesar insect. These differences, however, do not in my opinion, warrant the separation of a second species. The spurs of the legs of the Darjiling examples are doubtful as the legs have been broken off and reattached, possibly mistakenly.

Anabolia Stephens.

Anabolia Stephens.—Ill. Brit. Ins., p. 229, *partim* 1837; McLach.—Rev. and Syn. Trich., p. 101, 1875; Ulmer.—Gen. Insect., fasc. 60a, p. 45, 1907.

Spurs 1, 3, 4, ♂ ♀. Anterior tarsi with the first joint long in both sexes. Antennae about the length of the wings, moderately stout. Anterior wings elongate, nearly unicolorous, fuscous, gradually, but not widely, dilated to the apex which is parabolic; discoidal cell and most of the apical cellule long; external basal cellule and ninth apical cellule short, the latter not extending to the anal angle; membrane scarcely granulose; no pterostigma. In the posterior wings, the fourth apical cellule at its base is as broad as the second, and is closed by an oblique nervule. Superior appendages of the ♂ very large; intermediate forming two long laterally-lanceolate blades; inferior short and cylindrical. Penis-sheaths furcate at the apex; penis slender, simple. No ventral teeth in either sex. In the ♀, the abdomen is very obtuse; ninth dorsal segment small; no appendages, but the tubular piece above forms broad sub-quadrangle lobes.

I have given above McLachlan's description of the genus. The single Indian known species, *oculata*, has been described by Martynov and placed in *Anabolia*. I am unacquainted with the species and cannot say to what extent the neuration conforms with the above characters as the wings are not figured.

Anabolia oculata Martynov. (Text-figs. 11-13).

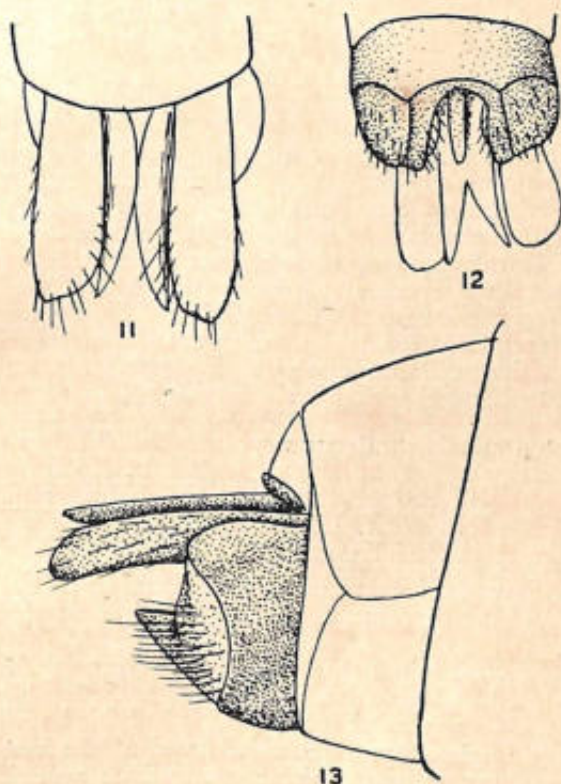
Anabolia oculata Mart.—Ann. Mus. Zool. Acad. Sci. St. Petersb., xiv, pp. 259-60, Pl. V, figs. 1-3, 1909.

Head, thorax and abdomen blackish fuscous; antennae black; maxillary palpi fuscous; coxae and femora black, anterior and median tibiae fuscous, tarsal joints testaceous, at the apex brownish; tibiae of the posterior pair proximally testaceous, distally fuscous; spines black. Anterior wings fuscous with some hyaline markings:

- (a) a hyaline transverse spot at the base of second, third, fourth and fifth apical cells;
- (b) a large irregular spot at the end of the thyridial cell and in the sub-discoidal area;
- (c) a small transverse narrow spot before the pterostigma;
- (d) a small spot at the end of the sixth apical cell;
- (e) along the veins and on costal and post-costal areas there are small pale dots.

Neuration black; posterior wings sub-hyaline; the fourth apical cell at the base as broad as the second; cubitus furcate at the quarter beyond the level of the discoidal cell.

Genitalia ♂.—Superior appendages blackish; from the side, superior margin convex, inferior slightly concave; the apex slightly



Figs. 11-13. *Anobolia oculata* Mart., ♂. Fig. 11, genitalia dorsal. Fig. 12, ventral. Fig. 13, lateral (after Martynov).

bent downwards; they are narrow, entire (not divided at the end); intermediate appendages (tenth segment) black, divergent and as long as in European species; side-pieces of the ninth ventral segment large, posterior margin impressed and covered with black hairs; inferior appendages forming a narrow margin along the edge of the ninth ventral segment (beneath), with ends produced somewhat triangularly (if seen from the side), all these anal parts blackish; penis not exerted.

Length of body 13 mm.; expanse 35 mm.

♂.—Tibet Orient; -vii-1901, Kozlov.

Stenophylliella gen. n.

Maxillary palpi ♂, first joint rather more than half the length of the second which is slightly shorter than the third. Antennae

longer than the anterior wing, basal joint large, the second very short, about half the length of the following ones. Wings large, anterior brownish with faint yellowish annulations, membrane not granulose and covered with fine recumbent black hairs, apices considerably dilated. Posterior wings very broad; sub-hyaline, no scales in the anal region. Legs with spurs 1, 3, 4 and black spines but there are no spines on the terminal tarsal joint. Genitalia showing an affinity with those of the species of *Pseudostenophylax*.

Stenophylliella closely resembles the European genus *Stenophylax* and it is scarcely possible to find any substantial difference in neuration or the armature of the legs to separate them. But I am unwilling to place the single Indian known species in *Stenophylax* as this genus is already overloaded with incongruous forms and a far closer affinity is shown with Martynov's genus *Pseudostenophylax* although the scales on the posterior wings, which are a prominent feature of this genus is wanting.

Details of the genitalia appear in the specific description.

Genotype: *Stenophylliella kashmirensis* sp. n.

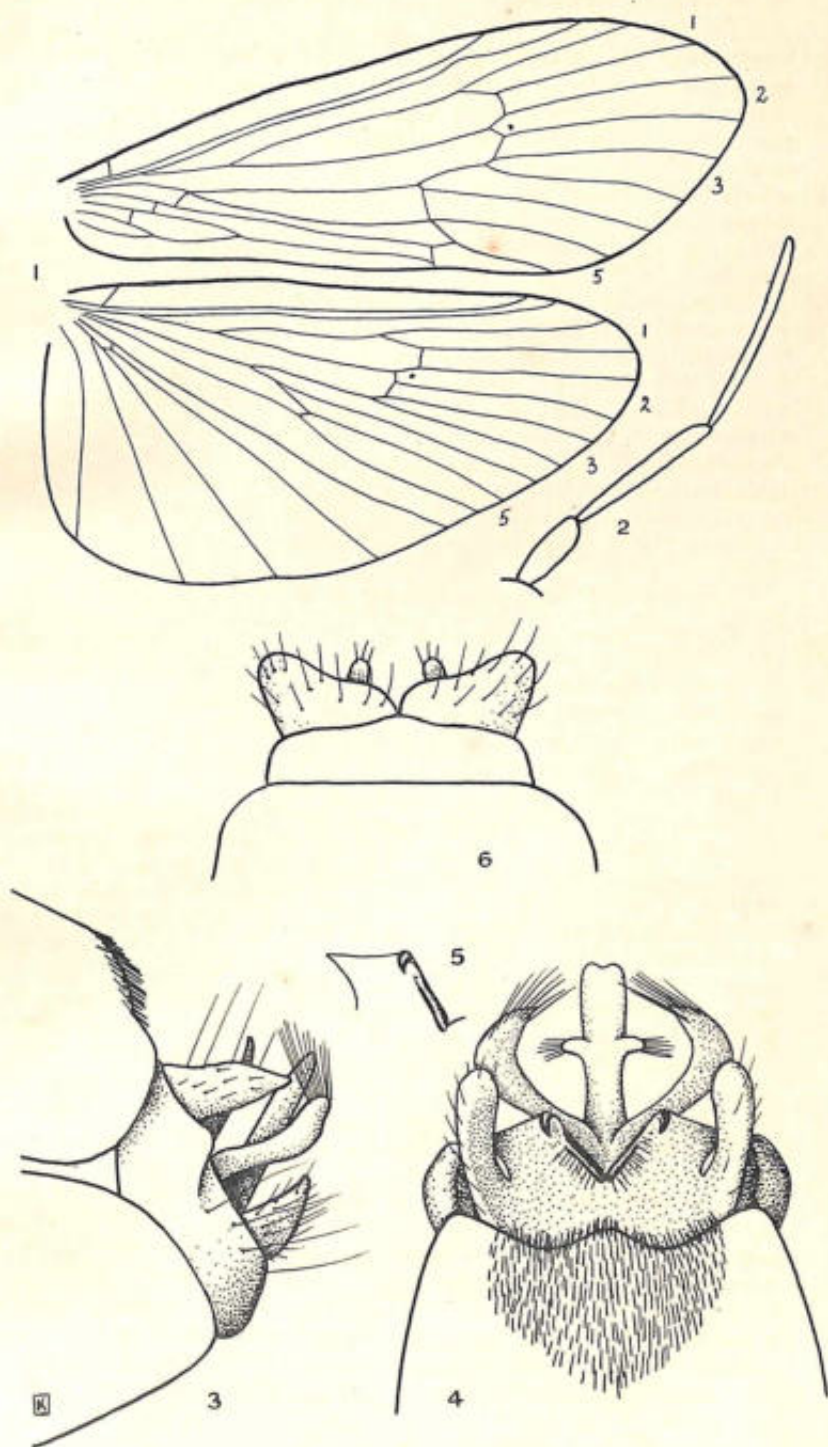
Stenophylliella kashmirensis sp. n. (Pl. XV, figs. 1-6).

The two examples of this species were collected in fluid by the late F. J. Mitchell and subsequently mounted in balsam. They are large insects, anterior wings brownish with faint yellow irrorations, apices considerably dilated, membrane set with short black setae between longer recumbent black hairs but scarcely granulose. Legs with spurs 1, 3, 4; no spines on the terminal tarsal joint.

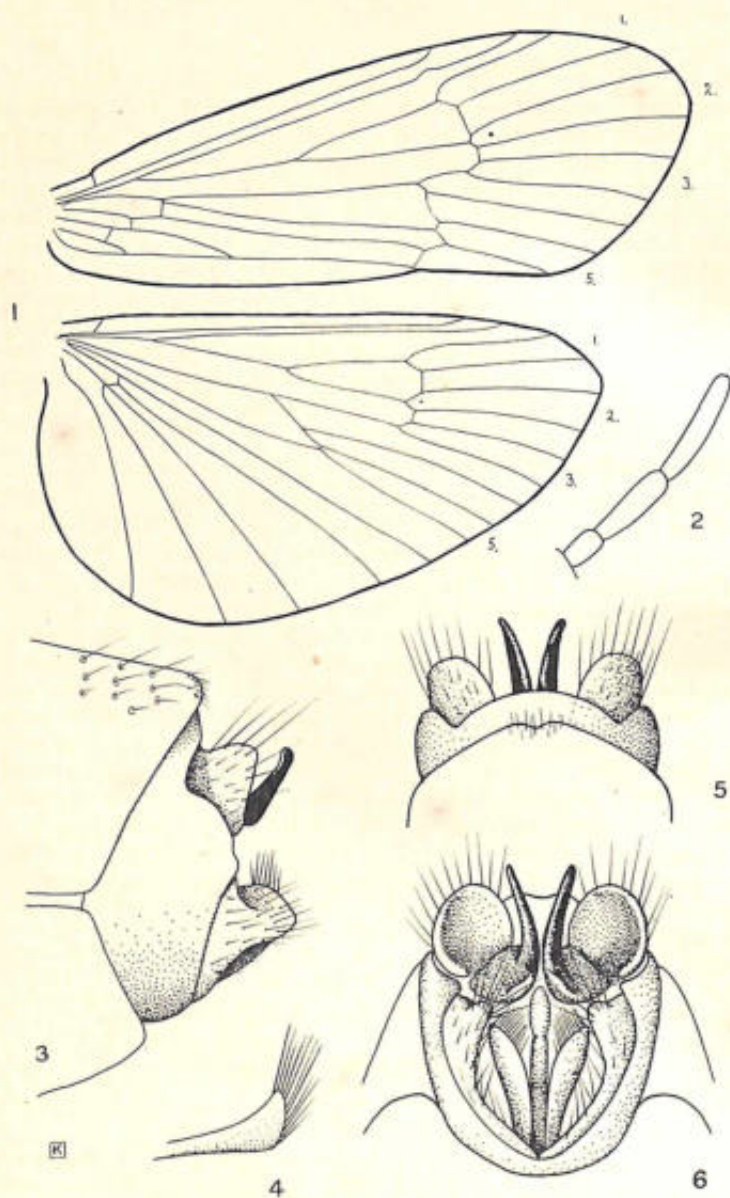
Genitalia ♂.—Margin of the eighth dorsal segment from above, slightly produced at its centre and covered with fine black setae; superior appendages from above and slightly behind, rather large, dilated at their apices; from the side, broad at the base tapering from about midway to acute apices; intermediate appendages from above and slightly behind, broad, apices truncate, with the inner angles turned upwards in acute blackened processes, the outer angles produced in broad triangular plates; the appendages are divided from each other by a wide triangular excision of which the margins are rolled over towards the base; from the side, the appendage appears as an upwardly directed blackened spur; penis straight, bearing two lateral processes about midway, one on each side making a cross, each furnished at its apex with long hairs, apex of the penis slightly excised; penis-sheaths appear as strong curving arms at the sides of the penis, caliper-shaped, apices curving inwards and furnished with bunches of bristles which meet inward across the penis, from the side they curve slightly upward; inferior appendages from the side narrow and pointed broader at the base; from beneath very broad, apices truncate or sinuous, each with a small blunt process towards its inner angle; ventrally the appendages nearly touch at their inner margins and are divided from each other by a narrow V-shaped excision.

Length of anterior wing ♂ 18 mm.

Kashmir, F. J. Mitchell.



Stenophylliella kashmirensis sp.n., ♂. Fig. 1, wings. Fig. 2, maxillary palpus. Fig. 3, genitalia, lateral. Fig. 4, dorsal. Fig. 5, intermediate appendage, dorsal. Fig. 6, inferior appendages, etc., ventral.



Astenophylina kashmirus sp.n., ♂. Fig. 1, wings. Fig. 2, maxillary palpus.
 Fig. 3, genitalia, lateral. Fig. 4, penis sheath, lateral. Fig. 5, genitalia,
 dorsal. Fig. 6, from behind.

Type ♂ and paratype ♂ in the author's collection, both mounted in balsam.

Astenophylina gen. n.

Insects large and brownish, wings rather short and rounded, sub-costa joined to the radius by a cross vein; first apical sector in each wing curved at its base; second apical cellule very broad at its base; discoidal cell short and broad in each wing; surface of the wings not granulose or set with short stiff hairs. Maxillary palpi very short, no longer than the labial palpi, but possibly abnormal in the unique type; basal joint very short, second joint slightly shorter than the third. Legs, spurs 1, 3, 4; terminal tarsal joints furnished with black spines. Genitalia conforming with the *Pseudostenophylax* group in respect to the fringed penis-sheaths and small inferior appendages, but without the black setae bordering the margin of the eighth segment.

Astenophylina kashmirus sp. n. (Pl. XVI, figs. 1-6).

The unique type was collected in fluid and subsequently dried out and set; beyond that it is a brownish insect, it would hardly be safe to give a description of its general appearance; characters other than genitalia are noted in the generic description.

Genitalia ♂.—Margin of the eighth dorsal segment without any mat of black setae; in the unique type, the ninth segment is rather extruded, its dorsal margin rounded; superior appendages short and rounded, ear-shaped, fringed with long fine hairs, triangular from the side with a wide base; between them, from above, are the intermediate appendages which are narrow, strongly chitinised with approximate bases and widely divergent apices, from the side, directed upward; penis, from beneath, slender, with an ovate apex and two stout sheaths each broadened at its apex and with a produced upper angle as seen from the side; inferior appendages short and triangular, welded to the ninth segment, fringed with long black hairs; ninth ventral segment deeply excised with a large rounded excision.

Length of anterior wing 15 mm.

India; Kashmir, R. Arrah, F. J. Mitchell.

Type ♂ presented by the author to the British Museum.

Stenophylax (Allophylax) indicus Navás.

Stenophylax (Allophylax) indicus Navás.—Mem. Ac. Pont. Rome, (2) Nuov. Linc., iii, pp. 9-10, 1917.

I am unacquainted with this Darjiling species and therefore give the description as written by the author. No figures are given.

'Caput, palpi, antennae testaceae, pilis testaceis; ocellus plumbeis; oculi fuscis.

Thorax fusco-ferrugineus, pilis fuscis.

Abdomen testaceo-ferrugineum, pilis testaceis brevibus, sparsis; ultimo tergito ♂ denticulis nigris toto vestito, margine postico truncato; cercis superioribus brevibus, intermediis adscendentibus

acutis; copulatore exerto cylindrico; lamina subgenitali seu ultimo sternito in processum longum filiformem cylindricum producto. Pedes testacei, pilosi, nigro setosi, calcaribus 1, 3, 4 longis, fulvis.

Ala anterior in tertio apicali lata apice rotundata; margine externo obliquo; membrana tota minute granulata, leviter fusco tincta, pone procubitum usque ad marginem posticum densius fuscata; tota maculis sive guttis parvis rotundatis pallidis conspersa, in tertis posteriore distinctioribus; stria pallida ad thyridium; pubescentia brevi, fusca; fimbriis brevibus, fulvis; reticulatione fulvo-testacea; cellula discali, longissima, saltem quater longiora suo petiolo; furca apicali prima parum intra cellulam discalem penetrante. Ala posterior basi lata, apice parabolice rotundata; membrana tota minutissime granulata vel potius impresso-punctata, hyalina, levissime fulvo tincta, distinctus in tertio apicale; pubescentia fimbriisque fulvis; reticulatione fulvo testacea; cellula discali longa, bis vel ter longiore suo petiolo, furca apicale prima parum cellulam discalem penetrante.

| | ♂ | ♀ |
|---------------------|----------|----------|
| Long. corp. ... | 14 mm. | 13 mm. |
| Long. ala post. ... | 18.5 mm. | 17 mm. |
| Long. ala post. ... | 15.5 mm. | 14.7 mm. |

Patria Asia. Darjeeling in montibus Himalaya 1910 (Coll. m.). Si formam cellulae discalis attendas haec species ad genus *Allophylax* Banks referenda; sed genus hoc mea sententia omittendum, quod caractere parum conspicuo et definito nitatur. videlicet cellulae discalis et furcae apicalis primae longitudine quae summopere variat.

The presence of the genus *Stenophylax* Kol. in India requires confirmation, so I defer giving a description of the genus for the time being.

APATANIINAE Ulmer.

Apataniinae Ulmer.—Ab. Natur. Ver. Hamb., xviii, pp. 42, 74, 1903.

The *Apataniinae* are separated from the *Limnophilinae* by the abnormal neuration of the anterior wing in which the sub-costa ends in a cross vein joining the radius and costal margin instead of continuing directly to the margin.

The Indian fauna so far known contains only the two genera *Apataniana* and *Apatidea* separated as follows:

TABLE OF GENERA.

1. Discoidal cell of the posterior wing present. APATANIANA
nov. gen. p. 475
- Discoidal cell of the posterior wing absent. APATIDEA Mc-
Lach. p. 476

¹ Since this part was sent to press, a large collection has been received from Assam and Burma containing at least one new genus in this sub-family. A description will appear later on in a supplement.

acutis; copulatore exerto cylindrico; lamina subgenitali seu ultimo sternito in processum longum filiformem cylindricum producto. Pedes testacei, pilosi, nigro setosi, calcaribus 1, 3, 4 longis, fulvis.

Ala anterior in tertio apicali lata apice rotundata; margine externo obliquo; membrana tota minute granulata, leviter fusco tineta, pone procubitum usque ad marginem posticum densius fuscata; tota maculis sive guttis parvis rotundatis pallidis conspersa, in tertis posteriore distinctioribus; stria pallida ad thyridium; pubescentia brevi, fusca; fimbriis brevibus, fulvis; reticulatione fulvo-testacea; cellula discali, longissima, saltem quater longiora suo petiolo; furca apicali prima parum intra cellulam discalem penetrante. Ala posterior basi lata, apice parabolice rotundata; membrana tota minutissime granulata vel potius impresso-punctata, hyalina, levissime fulvo tineta, distinctus in tertio apicale; pubescentia fimbriisque fulvis; reticulatione fulvo testacea; cellula discali longa, bis vel ter longiora suo petiolo, furca apicale prima parum cellulam discalem penetrante.

| | ♂ | ♀ |
|---------------------|----------|----------|
| Long. corp. ... | 14 mm. | 13 mm. |
| Long. ala post. ... | 18.5 mm. | 17 mm. |
| Long. ala post. ... | 15.5 mm. | 14.7 mm. |

Patria Asia. Darjeeling in montibus Himalaya 1910 (Coll. m.). Si formam cellulæ discalis attendas haec species ad genus *Allophylax* Banks referenda; sed genus hoc mea sententia omittendum, quod caractere parum conspicuo et definito nitatur. videlicet cellulæ discalis et furcae apicalis primae longitudine quae summopere variat.¹

The presence of the genus *Stenophylax* Kol. in India requires confirmation, so I defer giving a description of the genus for the time being.

APATANIINAE Ulmer.

Apataniinae Ulmer.—Ab. Natur. Ver. Hamb., xviii, pp. 42, 74, 1903.

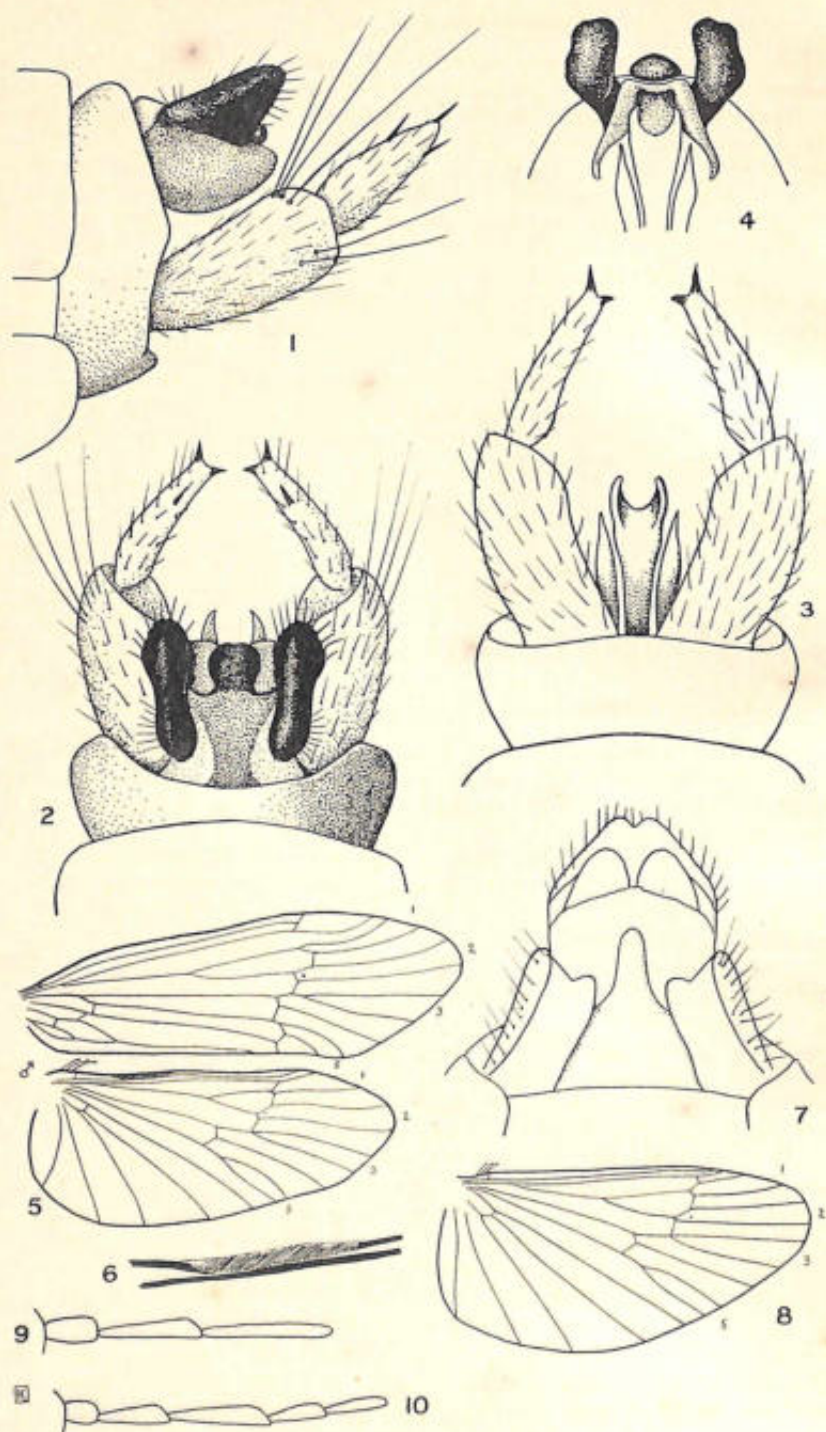
The *Apataniinae* are separated from the *Limnophilinae* by the abnormal neuration of the anterior wing in which the sub-costa ends in a cross vein joining the radius and costal margin instead of continuing directly to the margin.

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1. Discoidal cell of the posterior wing present. APATANIANA
 nov. gen. p. 475
 —Discoidal cell of the posterior wing absent. APATIDEA Mc-
 Lach. p. 476

¹ Since this part was sent to press, a large collection has been received from Assam and Burma containing at least one new genus in this sub-family. A description will appear later on in a supplement.



Apataniana hutchinsoni sp.n. Fig. 1, genitalia ♂, lateral. Fig. 2, dorsal. Fig. 3, ventral. Fig. 4, apices of superior appendages and penis, etc., ventral. Fig. 5, wings ♂. Fig. 6, costal margin of posterior wing ♂, enlarged. Fig. 7, genitalia ♀, ventral. Fig. 8, posterior wing ♀. Fig. 9, maxillary palpus ♂. Fig. 10, maxillary palpus ♀.

Apataniana gen. n.

The genus has been erected to take the new species *hutchinsoni* in which the characters of neuration differ considerably from all other genera in the *Apataniinae*.

Maxillary palpi ♂, first joint about half the length of the second which is slightly shorter than the third; ♀, first joint less than half the length of the second, third joint almost as long as the first and second together, fourth joint slightly shorter than the fifth which is about twice the length of the first. Antennae slender, about the same length as the anterior wing; basal joint large, second short, remaining joints each longer than the second. Wings; anterior alike in both sexes; sub-costa running into a cross vein joining the costa to the radius, forks Nos. 1, 2, 3 and 5 present, discoidal cell closed, moderately long and narrow; posterior wings broader than the anterior, sub-costa parallel with the radius, construction differing in the sexes; in the ♂ there is a narrow fold or flap along the costal margin towards the base of the wing lined with coarse yellow hairs; this fold is wanting in the ♀; discoidal cell closed, forks Nos. 1, 2, 3 and 5 present; in the ♂, radius running into the first apical sector, first apical fork short and rather broad at the base, second as long as the third which is sessile, fifth short and with a distinct foot-stalk. Spurs 1, 2, 4.

Genotype: *Apataniana hutchinsoni* sp. n.

Apataniana hutchinsoni sp. n. (Pl. XVII, figs. 1-10).

Head dark fuscous with light honey-coloured hairs; palpi dark fuscous; antennae dark ochraceous with narrow black annulations; prothorax, mesothorax and metathorax black; legs ochraceous, spurs black, 1, 2, 4.

Wings, anterior greyish with honey-coloured hairs; whitish patches along the apical border between the apical sectors, posterior wings greyish, ♂ with a fold, filled with yellow hairs in the costal margin towards the base.

Neuration as shown in Pl. XVII, figs. 5-6, 8.

Genitalia ♂.—Margin of the ninth dorsal segment very broadly and shallowly excised; there are two short black superior appendages, apices somewhat dilated and serrate. Between them is a dorsal plate narrow at the base, broadening in two wide lateral triangular shelves; the apex of the dorsal plate is produced in a rounded blackened process; beneath this plate is a strongly chitinised arched structure, sides very deep and slightly inturned beneath; penis from beneath, narrow at the base, broadening to a widely excised apex; there is a pair of penis-sheaths, one on each side, rather shorter than the penis, inferior appendages two-jointed, basal joint very stout, terminal more slender, slightly shorter, apex armed with two or three short acute spurs; there is also a single spur on each joint slightly before the apex.

Genitalia ♀.—Beyond the terminal dorsal segment is a small penthouse-shaped process with a slight excision at the apex; from beneath there are two chitinous plates towards the apex;

below this is the long central lobe of the vulvar scale, the outer lobes being formed by the produced lateral margin of the terminal segment.

Length of anterior wing ♂ and ♀ 10 mm.

Western Tibet; Kyam, 19-25-vii-1932, G. E. Hutchinson, Yale North India Expedition, 7 ♂♂, 1 ♀.

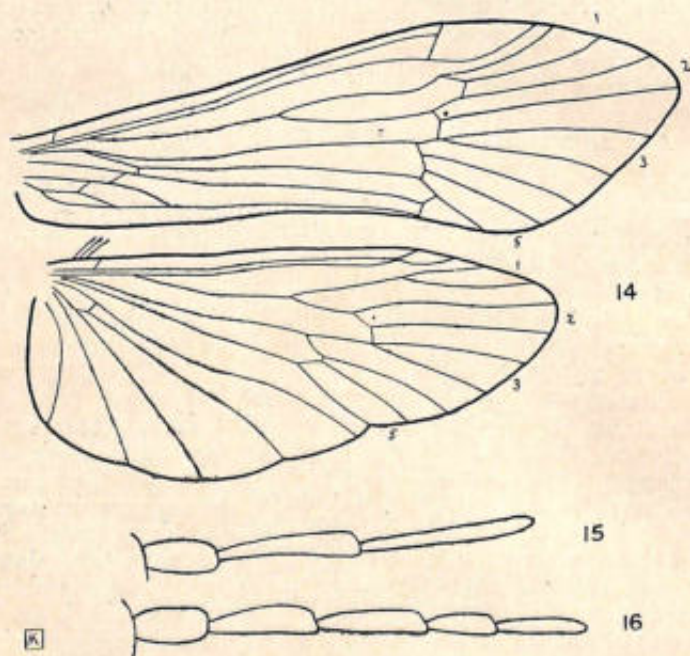
The collector, Dr. Hutchinson, to whom I have much pleasure in dedicating the species, states that the examples were all found under stones.

Type ♂ and paratypes ♂ and ♀ in the collection of the British Museum. Paratypes ♂ in the collection of the Yale University, U.S.A.

The genitalia of *hutchinsoni* closely resemble Martynov's figures of *Apatania bulbosa* which in the ♂ posterior wing also displays the narrow costal fold with the yellow hairs but in respect to other features of neuration, *bulbosa* is very abnormal.

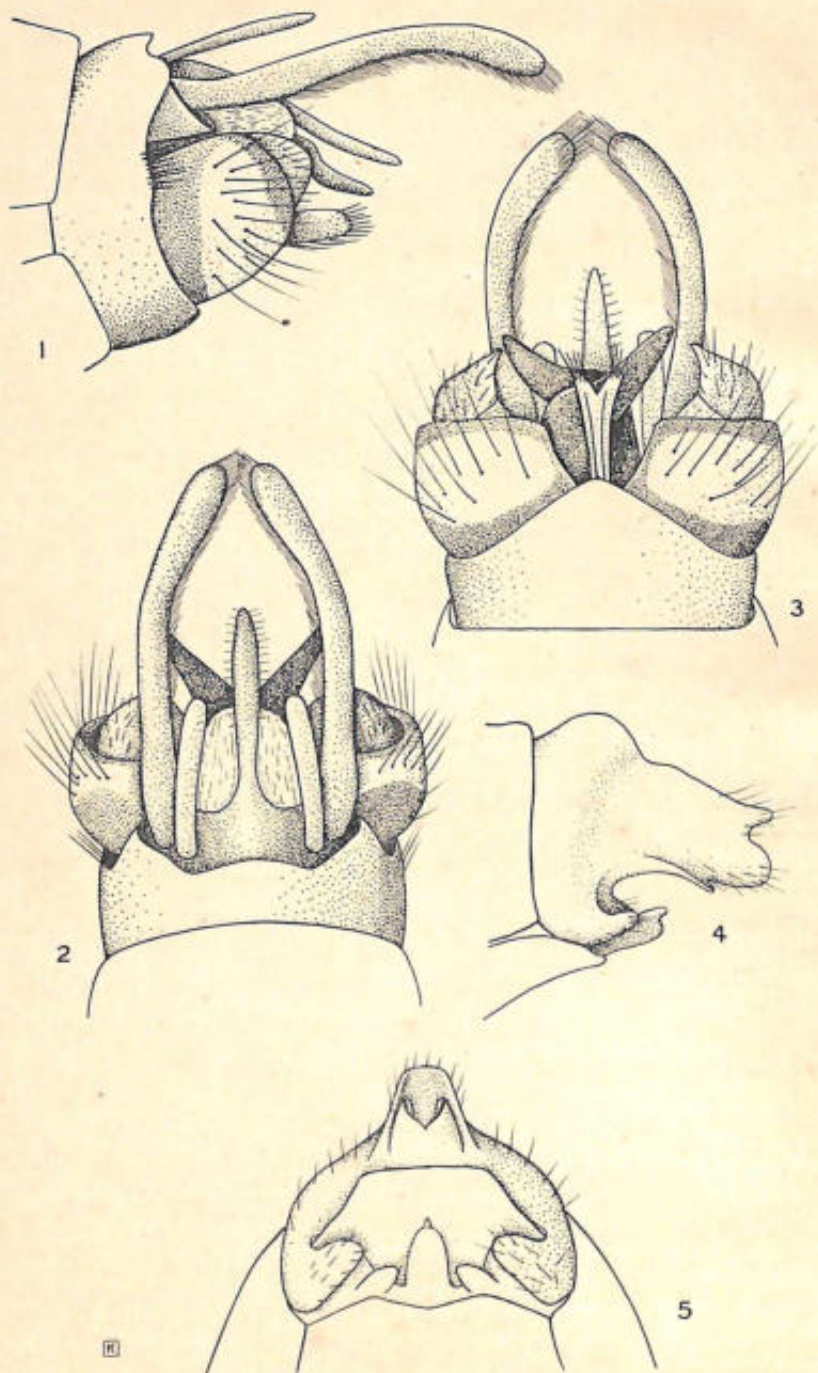
Apatidea McLachlan (Text-figs. 14-16).

Apatidea McLach.—Rev. and Syn. Trich., p. 217, 1876.



Figs. 14-16. *Apatidea brevis* sp.n., Fig. 14, wings ♂. Fig. 15, maxillary palpus ♂. Fig. 16, maxillary palpus ♀.

Apatelia Wallengren, subgenus of *Apatania*.—Ent. Tidsk. Arg., 7, H. 2, p. 78, 1886; Skand. Neur.—Kongl. Sv. Vet.—Akad.



Apatidea brevis sp.n. Fig. 1, genitalia ♂, lateral. Fig. 2, ♂, dorsal. Fig. 3, ♂, ventral. Fig. 4, genitalia ♀, lateral. Fig. 5, ♀, ventral.

Handl., Bd. 24, N. 010, p. 88, 1891; Martynov.—Ann. Mus. Zool. Ac. Sci., xxii, pp. 59, 63, 1918.

Maxillary palpi ♂, first joint about half the length of the second which is slightly shorter than the third; ♀, basal joint short, about two-thirds the length of the second, third equal to the second, fourth equal to the first and slightly shorter than the fifth. Antennae, basal joint large, the second very short, remaining joints each longer than the second. Anterior wing; the sub-costa ends abruptly in a transverse nervure joining the costa and radius; radius heavily fringed with short thick hairs; discoidal cell long and narrow, upper margin slightly excised, first apical cell very acute at its base, second, third and fourth truncate, fifth with a minute foot-stalk. Posterior wing; the radius is arched towards its distal end to touch or nearly touch the sub-costa; sometimes not suddenly arched but confluent at a point towards the distal end, sometimes joined by a minute cross vein; lower margin of the wing slightly scalloped.

Spurs 1, 2, 2 or 1, 2, 4 ♂ and ♀.

Genotype: *Apatidea copiosa* McLach.

A few words are required in explanation of the synonymy. The sub-genus *Apatelia* was erected by Wallengren in 1886 to take the species *inornata* Wallengr. and *fimbriata* Pict. in both of which the radius and sub-costa are partly confluent in the posterior wing. In 1918 Martynov raised the sub-genus to full generic status. At the same time, he revised McLachlan's genus *Apatidea* in which two species had been described, *elongata* McLach. and *copiosa* McLach. placing the former in *Apatania* and the latter in *Apatelia* with the consequent entire disappearance of McLachlan's genus. In *copiosa*, the neuration of the posterior wing is similar to that of *fimbriata*.

Martynov in this transgressed the laws of priority, McLachlan's *Apatidea* having been erected ten years prior to *Apatelia* Wallengr. As neither McLachlan nor Wallengren selected genotypes of their respective genera, I here fix *copiosa* McLach. as the genotype of *Apatidea* McLach. 1876 and *fimbriata* Pict. as the genotype of *Apatelia* Wallengr. 1886, the latter genus thus becoming a synonym.

Apatidea brevis sp. n. (Text-figs. 14-16, Pl. XVIII, figs. 1-5).

Head and oculi black, particularly the oculi; palpi fuscous; antennae fuscous, no noticeable annulations; prothorax, mesothorax and metathorax dark fuscous. Wings, anterior castaneous posterior rather paler, for neuration, see text-fig. 14. Legs fuscous, spurs 1, 2, 4; abdomen castaneous, paler beneath.

Genitalia ♂.—The margin of the ninth dorsal segment widely excised with the central portion of the excision slightly produced and rounded, sides curling slightly under to make sockets from which arise the intermediate appendages; beyond it is a median process, wide at the base and produced in a long, slender, tailwardly and downwardly directed finger; on each side of this process are the superior appendages which are considerably shorter than the median process; intermediate appendages very long and

strongly chitinised, heavily fringed, apices dilated and turned slightly downward; penis narrow, apex widely furcate, apex of each fork bearing two or three spines, beneath the penis are two long thin spines which are divergent so that they lie closely under the forks of the penis; penis-sheaths wide at their bases which cross, one over the other so that the narrower apices are widely divergent; inferior appendages two-jointed, basal joint short, very stout and round, terminal joint turned in and rather pointed.

Genitalia - ♀.—From beneath, tubular piece narrow, central lobe of the vulvar scale broad and long, from the side, very deep, upper margin produced to make a small finger; side lobes very short and rounded; there is a broad, transparent sub-genital plate welded beneath to the tubular piece which, from the side is widely cleft.

Length of anterior wing ♂ 5.5-10 mm.; ♀ 8-10 mm.

Kashmir; Gagirbal, 5,190 ft., F. J. Mitchell, numerous ♂♂ and ♀♀; Killanmarg, 10,500 ft., 13-vii-1931, Fletcher Coll., 2 ♂♂, 19-22-vii-1923, Fletcher Coll., 1 ♂.

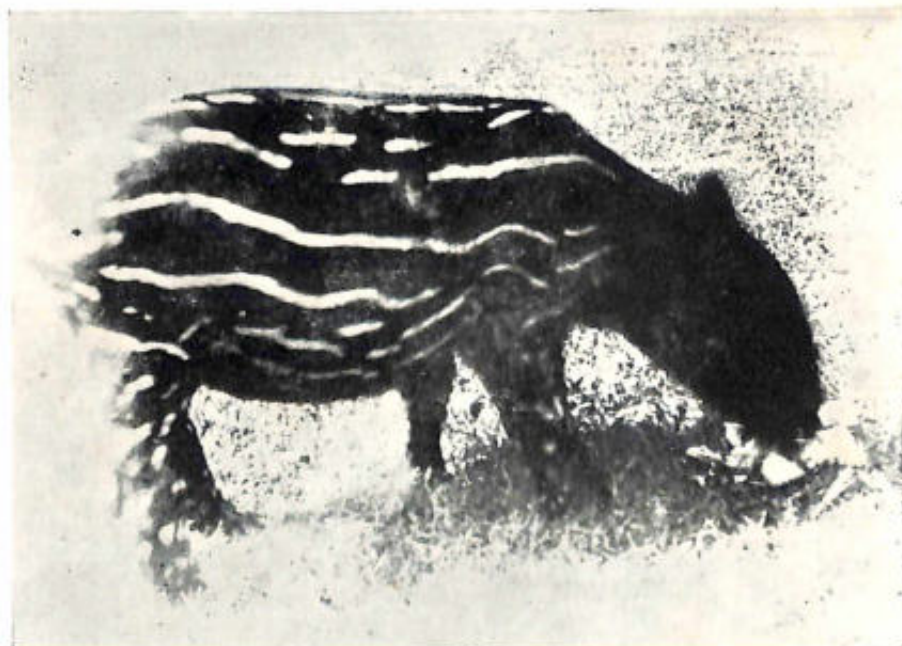
Type ♂ (Gagirbal) in the author's collection; paratypes ♂ and ♀, details as above, in the author's and the British Museum collections.

The species is very variable in size, the diminutive ♂ with a 5.5 mm. wing being recorded from Kashmir, Killanmarg, 10,500 ft., the larger from Kashmir, Gagirbal, at 5,190 ft. *Brevis* bears a close resemblance to the Turkestan species *Apatidea copiosa* McL. but differs in the arrangement of spurs and in the length of the superior appendages which, in *copiosa*, are longer instead of shorter than the median process.

(To be continued).



Tapir shot by the author.



Young tapir caught by the author after its mother was shot in Tavoy.

THE MALAY TAPIR (*TAPIRUS INDICUS*).

BY

W. S. THOM.

(*With one plate.*)

The Burmese call the tapir *Kyan-thu-daw*. I have never heard it called *Tarashu*. *Tarashu* does not appear to me to be a Burmese name although it is mentioned in the *Fauna of British India*, and in E. H. Peacock's book *A Game Book for Burma*. The name may be peculiar to Tavoy or Mergui where alone in Burma this animal is found, and where true Burmese is not spoken.

The tapirs, rhinoceroses, horses and wild asses, are included in the Perissodactyle or Three-toed Ungulates. Five species of tapirs are known to exist: of these four are confined to Central and South America; while the fifth is an inhabitant of the Oriental region, where it is found only in Lower Burma, the Malay Peninsula and Sumatra. The fact that tapirs are now found in limited areas separated by many thousands of miles from each other provides a good instance of the rare phenomenon of 'Discontinuous Distribution'. We know that in past geological epochs tapirs were abundant over a large portion of the Earth's surface. Their fossil remains have been dug up in many European countries. One explanation is that the tapirs were once prevalent in the northern countries. Owing to changes of climate and other conditions which are not very clear, they migrated southwards, and the existing tapirs now found in the Malay countries and America are the descendants of these emigrants. Or it may be that tapirs were once continuously distributed over the Earth's surface from north to south, that they ceased to exist in the northern countries and we have now only to deal with the few scattered remnants of what was once a widely distributed tribe.

The Malay Tapir, which is the largest of the group, is readily distinguished from all its South American cousins by the parti-coloured hide of the adult; the head, limbs, and front part of the body being dark brown or black, while all that portion of the body situated behind the shoulders including the rump, and the upper part of the thighs, together with the tips of the ears, are greyish white, or white in the adult. In very young animals on the other hand, that is to say those not exceeding from four to six months in age, the ground colour is blackish-brown or black marked (as in the young of the American species), with longitudinal streaks of yellow on the under parts. The hair too is markedly denser than in the full-grown animal. In height an adult tapir stands from three to three and a half feet at the withers and about four inches more at the rump; the length from the tip of the snout to the root of the tail measured along the curves of the body being about eight feet.

Its habits are in all probability very similar to those of the American representatives of the genus. Like the rhinoceros, tapirs love wallowing in water and in mud holes in the deepest recesses of the jungle. Another habit common to tapirs and some rhinoceros is that their droppings are sometimes found in large heaps. They also browse on twigs and leaves like rhinoceros. All tapirs are extremely shy and retiring animals dwelling amid thick jungle in the neighbourhood of water to which they take readily. They are easily tamed and make very docile pets, following one about like a dog. A young one was caught in Tavoy, Lower Burma, 26 years or so ago and presented to Major Reid, a one time Deputy Commissioner of Tavoy. This animal was, if I mistake not, subsequently given to Colonel King, I.M.S., Burma, who presented it to the Maharajah of Mysore, India. I wonder if it is still alive. These animals are generally nocturnal in their habits. Their sense of sight, smell, and hearing is very acute. I should say that their sense of scent was equal to that of any deer, elephant, wild cattle, thakin, or rhinoceros. I would also go as far as to say that their sense of sight is more acute than that of any animal to be found in the jungles of Burma. I have tracked up and followed tapir on many occasions accompanied by only one experienced Burman hunter, and although we could both cover the ground as noiselessly as cats, the animals invariably stampeded before we came up with them and made off at a lumbering gallop uttering a succession of squeaks and snorts. My intention on those occasions was not to shoot the animals but to study their habits and also to get a photograph. These animals are rarely met with during the day unless they are tracked up to their resting places and wallows or are driven out of their haunts by the larger felines or by beaters. They usually inhabit low-lying, flat, damp, swampy ever-green forests, but in Tavoy I have also come across them in jungle in close proximity to villages. They are, if I am not mistaken, never found in hilly country so far as Burma is concerned. I do not suppose any sportsman in Burma has seen as many tapir in their wild state as I have over a period of about two years. It may be thought that being such shy and timid animals they would be found far away from human habitations, but I have found their tracks in dorian and jackfruit gardens adjacent to villages. In the *Bombay Natural History Society's Journal*, vol. xx, No. 2, dated the 18th October 1910, p. 515, Mr. J. B. Mercer-Adam, F.C.H., of the Forests stated that a Burman of Kado village, Moulmein, had seen a tapir in his garden in the evening. The Burman although he did not recognize it as a tapir described it as a very large pig, half black and half white. Both tapir and rhinoceros revel in a country where the forests are dense and where the rainfall is heavy. Tapir never inhabit the high mountainous country frequented by the Sumatran rhinoceros (*R. sumatrensis*).

The Malay Tapir, which like rhinoceros is now entirely protected, offers little attraction to a European sportsman since it yields nothing in the way of a trophy except the skull.

skin and hoofs, and it is not given to charging or attacking human beings.

No European, Burman, Indian, or Karen hunter seeks to kill or catch tapir unless it be to capture a young for sale to some Indian prince or zoo; as their blood, unlike the two species of rhinoceros found in Burma, viz. *R. sumatrensis* and *R. sondaicus*, appears to possess no valuable properties. Any animal captured alive would of course belong to the Forest Department as it would come under the nomenclature of forest produce. A good many of these animals were trapped in pits and nets during beats in the bad old days for food principally, not only in Burma but in the Malay States. The residents of the two districts of Tavoy and Mergui however consider it a sin to kill a tapir; because, as the legend has it and as its Burmese name, *Kyan-thu-daw*, seems to imply, the animal is considered to be holy and more or less sacred because periodically about the full and new moon it visits the nearest salt-lick or hot sulphur springs of mineral and saline mud in the vicinity of its haunts as if to go into retreat, or to make as it were its orisons. The word *Kyan-thu-daw* literally translated would mean *Kyan* a rhinoceros and *thu-daw*, a person devoted to the service of religion, or in other words the worshipping or holy tapir; although why they should prefix the word '*Kyan*' before the *thu-daw* I am unable to say. It may perhaps be because the shape of the animal's foot is not unlike that of a rhinoceros. Indeed, in the old days, newcomers when out after game in the Tavoy and Mergui districts often mistook the tracks of a tapir for those of a small rhinoceros. Rhinoceros as a matter of fact visit salt-licks at regular intervals, once or twice a month with the new and the full moon as do tapir, and perhaps the Tavoyans and Merguians consider the tapir to be a religious attendant or follower of the rhinoceros; hence the name *Kyan-thu-daw*.

The first and only tapir bagged by me was in the Tavoy District. It was at a place called Mijjaunghlaung (the resort of crocodiles), where a magnificent morass of hot bubbling sulphur springs of mineral water and mud may be found situated in the heart of virgin tree, bamboo and cane forest, a veritable health resort of all wild animals who partake of the mud and waters in order to rid themselves of internal parasitic worms. As a matter of fact I was not out after tapir at the time but after 'tsaing' or banting (*Bibos banting birmanicus*) and bison (*B. gaurus*).

The water and mud in this morass or swamp was so hot that one could not walk in it bare-footed. The surface was pitted with the tracks of elephant, bison, tapir, sambar, hog deer and 'tsaing'. I heard the lumbering galloping sounds of the tapir's hoofs approaching, so unlike those of any other animal, excepting perhaps the buffalo and the rhinoceros. It was conjectured that it must be one or other of these and not a female tapir with a young one. It was all over in a few seconds. The jungle was dark and gloomy and objects were not easily discernible; the animal consequently as she galloped past received before it was known what manner of beast she was, a right and a left

behind the shoulder from a 12-bore 'Cosmos' ball and shot gun, which brought her to the ground with a nullah 150 yards further on, shot through both lungs. The young one which appeared in view some 50 yards or so behind its mother after I had fired at the latter, was captured after a short struggle and kept alive for a period of about a month when it succumbed to shock and blood poisoning in spite of every attention and a liberal use of antiseptics, as it was found that both it and her dam had been badly mauled either by a leopard, wild dogs, or a tiger. Probably it was a leopard that had attacked them with the object of making a meal of one or both; but had been frustrated in the attempt. The young one became so tame before its death that it used to follow me about when I called it, and eat plantains and jackfruit and the leaves of the latter tree from my hands.

The tapir has no means of defending itself with the exception of the kicking power of the hind legs which are not however propelled with sufficient force to be of much use as a means of defence sufficient to ward off an attack from the 'felidae' and wild dogs, their only enemies besides Man. The shape and position of the snout of the animal also makes any attempt at using its teeth with any great hope of success, well nigh impossible. If the hind legs could be used with the rapidity and force employed, shall we say, by an ostrich, horse, elephant, bison or even a mule, it might have some chance of holding its own. It is probably due to the tapir's acute sense of smell, sight and hearing that it is saved from early extinction. Its snout, like the trunk of an elephant, is extremely sensitive to pain and a struggle between a tapir and either a leopard, tiger or a pack of wild dogs would invariably end in the death of the tapir. The feet or hoofs make excellent trophies if properly mounted by a good taxidermist. I have all four feet of the only tapir shot by me beautifully mounted by Messrs. Rowland Ward, two of them as spirit cheroot lighters, one as a call bell, and the fourth as an inkstand. The flesh of the tapir although coarse is palatable enough and not unlike that of rhinoceros meat, but neither animal is sought after on account of its meat. The people moreover believe that the consumption of tapir flesh tends to cause leprosy which of course is a fallacy like many other of their beliefs.

Before ending my article on Tapir I would like to quote here a few extracts from an article which was published in the *Rangoon Gazette* of August 1935 by a correspondent of that paper, and which seems to me very apt. 'Nature', he says, 'is capable of surprises and even jests that upset our pre-conceived notions and theories, and not the least remarkable of these surprises is the tapir described by Mr. H. C. Smith, Honorary Game Warden of Burma, in his series on the wild animals of Burma'.

'When we think of wild animals we instinctively divine the thought further with recollections of animals we have read or heard or seen in zoos and films, we have had witness of the ferocity of the tiger and the lion; there is a smile for the antics of the monkey tribe, or for the ungainly absurdity of the rhinoceros

on his stumpy legs; and there is wonder and delight at the swift grace of the deer and antelope tribes. But what shall we say of the tapir? It is a perpetual refutation of the general application of theories on the struggle for existence. It is a shy and mild and gentle creature. It is easily tamed in captivity. It is nothing much to look at and its white overcoat is an amusing vagary of jungle fashion. The female is bigger than the male. A small shrill squeal is the only sound recorded in connection with the animal. It likes water and is credited by some with the extraordinary power of walking along the bottom of deep pools instead of swimming. It wanders silently and unobtrusively in the densest evergreen. It is not poached, the jungle people regarding it as is the fate of many philosophers living out of their time with "almost amused contempt". And the tigers do not seem to kill it. It is, as Mr. H. C. Smith remarks, a harmless and interesting animal. The tapir is in fact an enigma. It may be a survivor of some more gentle and legendary time, or it may be wandering in unique isolation in a world not yet mature enough for its wisdom. We should therefore cherish and protect the tapir, just as so many of the wild animals of Burma should be protected in case they are exterminated.'

Alas I am afraid I must plead guilty to having shot one of these inoffensive animals under rather peculiar circumstances in the Tavoy District many years ago, in the year 1909 to be exact, i.e., some twenty-six years ago. I wrote an account of this animal's death at the time and also described the tapir and its habits in detail. This appeared in a number of the *Asian* sporting paper which has now been defunct for many years.

These reminiscences of mine are after all of days gone by when much game was shot by sportsmen. This is a new age of licenses, game laws and protection. The old days are gone never to return.

THE ORNITHOLOGY OF TRAVANCORE AND COCHIN.

BY

SĀLIM ALI.

With Notes by HUGH WHISTLER.

PART IV.

(Continued from page 320 of this volume).

FAMILY: SYLVIIDÆ.

Acrocephalus stentorius brunnescens (Jerdon). The Indian Great Reed-Warbler.

Specimens collected: 286 ♀, 287 ♂ 15-2-33 Kottāyam S.L.; 422 ♂ 7-3-33 Kūmili 3,000 ft.; 1041 ♂, 1042 ♀ 30-12-33, 1052 ♂ 31-12-33 Karūpadanna ca. S.L.

Elsewhere noted at: Vembanād Lake (Trivandrum Environs).

Colours of bare parts: Iris hazel to olive-brown; bill, upper mandible excluding commissure horny-brown, commissure and lower mandible pale flesh colour, horny at tip; mouth bright orange-brick colour; legs and feet horny-grey or pale plumbeous; claws dusky.

[The Survey specimens measure:

| | Bill. | Wing. | Tail. | Tarsus. |
|-------|-----------|-------|---------|---------------|
| 4 ♂ ♂ | 24.5-26.5 | 87-94 | 76-84.5 | 27.5-29.5 mm. |
| 2 ♀ ♀ | 25.5-26 | 85-90 | 76-79 | 28 mm. |

Additional specimen from Travancore examined:

Brit. Mus. Coll.: ♀ 26-4-1910 Thodupuzha (Nair).

In *J.B.N.H.S.*, vol. xxxv, p. 450, I threw doubt on the validity of the resident breeding race in Ceylon *A. s. meridionalis* (Lægge), as the two specimens in the British Museum did not appear to me to be separable. Owing to the courtesy of the Director of the Colombo Museum I have examined four more specimens from Ceylon. Two of them are undated and one unsexed, whilst one of the others is very worn, but the series, so far as it goes, makes me more prone to accept the probability of a small and very dark Cinghalese race. Further material is required to settle the point, as although Mr. Stuart Baker (*Nidification*, ii, 356) accepts it, he considers it intermediate in character between *brunnescens* and his race *amyaæ*. The probability that true *brunnescens* reaches Ceylon as a winter visitor, living then alongside a resident separable race, must also be borne in mind.

In the *New Fauna*, ii, p. 388, the genus *Acrocephalus* is said to undergo a complete moult both in autumn and spring; and it appears to be certainly correct that there are complete moults in spring and autumn in the closely allied *Acrocephalus arundinaceus* (vide *Practical Handbook of British Birds*, i, 335). After examining a very large number of *A. s. brunnescens* I can however only come to the conclusion that there is no spring moult. The complete post-nuptial moult takes place from September to November. So far as I can ascertain the post-juvinal moult is complete.

In fresh autumn plumage this form is distinctly washed with grey on the upper parts, more particularly on the crown and hindneck. With wear in summer the colour becomes much duller and browner.—H. W.]

There is nothing on record to show the status of the Indian Great Reed-Warbler in Travancore and Cochin. The latest date on which the Travancore Survey came across it was 7 March among scrub and bushes on a seepage marsh by the margin of Periyār Lake. The birds were common there at that

time, but whether it is a resident species or not is doubtful. They were also abundant amongst the densely shrubbed bunds or dykes in the backwaters (consisting of *Pandanus* and clumps of tall coarse grass) where the birds hopped about in the undergrowth, occasionally clambering up into the overhanging fronds of coconut palms. It frequented similar environment at Karupadanna and about the Vembanād Lake. Specimen No. 1052 was a solitary bird obtained among bushes growing on a spit of dry sand on the sea-shore.

Besides the loud, harsh and often ventriloquistic song of the male which is uttered from exposed perches on bushes and the like, it has a harsh, single 'Ke' like *Turdoides*, uttered every few seconds and also a 'chr-r, chr-r', etc. similar to but much louder than that of the more familiar Blyth's Reed-Warbler.

Breeding: The gonads of the specimens were in an undeveloped condition. No. 1042 (20 December) was immature with two imperfectly ossified patches on the anterior part of the skull. No record of its breeding in this area exists, though it is not inconceivable that it may do so about the backwaters.

Acrocephalus dumetorum Blyth's Reed Warbler.

Specimens collected: 69 ♀ 12-1-33, 96 ♀ 14-1-33 Marāiyūr 3,500 ft.; 113 ♂ 19-1-33 Münnār 5,000 ft.; 148 ♀, 149 ♀ 25-1-33 Sānthanpāra 3,500 ft.; 210 ♂ 4-2-33 Thattākād 200 ft.; 324 ♀ 21-2-33, 342 ♀, 343 ♂ 23-2-33, 360 ♂ 25-2-33 Peermade 3,200 ft.; 396 ♀ 3-3-33 Kōmili 3,000 ft.; 554 ♂ 10-4-33, 562 ♂ 11-4-33 Cape Comorin ca. S.L.; 960 ♂ Nemmāra 300 ft.

Elsewhere noted at: Kottāyam (ca. S.L.); Wūdamet; Rājampāra (1,350 ft.); Tenmalāi (500 ft.); Kūriārkkūtti (1,600 ft.); Wadakkāncheri (400 ft.); Pādāgiri (3,000 ft.—Nelliampathy Hills).

Colours of bare parts: Iris hazel-brown (dark straw colour in one); bill, upper mandible horny-brown; lower mandible pale flesh colour; mouth orange-yellow or pale pinkish-yellow; legs, feet and claws greyish flesh colour; soles pale yellow. In the albino (No. 210): Iris olive-brown; bill pinkish flesh colour slightly brown on upper mandible; mouth orange-yellow; legs, feet and claws yellowish flesh colour.

[Additional specimens examined:

B. M. Coll.: ♀ 7-4-07 Manthukuly [Mūthūkūzhi ?], Travancore (Nair); ♂ 6-2-80 Mynall (Bourdillon); ♂ 7-3-77 Mynall (Hume Coll.).

Measurements:

| | Bill. | Wing. | Tail. |
|-------|-------|---------|---------------|
| 1 ♂ | 17 | 63.5 | 53 mm. |
| 6 ♀ ♀ | 16-18 | 60-62.5 | 51.5-54.5 mm. |

This common migrant arrives in India in worn breeding dress and the complete moult takes place from August to November, mostly in September and October. The spring moult, which I think is confined to the chin, throat and breast, is late, taking place about April and May. The upper plumage becomes much duller and browner by wear.

Some juveniles arrive in India before the post-juvinal moult. They may be distinguished, in addition to the softer character of the plumage, by being a more rusty-brown above, especially on the rump and upper tail coverts (thereby recalling *Acrocephalus scirpaceus*) and on the edgings of the wings and tail, the quill feathers being altogether duller and washed with this colour; the underparts are slightly paler.

I suggest that the post-juvinal moult is usually complete, but that some individuals do not moult the primaries, primary coverts, secondaries and greater coverts or the tail.—H. W.]

Blyth's Reed-Warbler is a common winter visitor to Travancore and Cochin. A marked decrease in its numbers was observed by the beginning of April. The last date on which the Survey came across it and obtained a specimen was 11 April, by which time most birds had departed. This specimen was very fat also, suggesting that it was ready to emigrate.

In the cold weather it is a common species in hills and plains alike, frequenting scrub country, hedges and brushwood. At Pādāgiri (3,000 ft.) in the Nelliampathies it was particularly abundant in the dense bracken thickets on

water-logged patches along the hillstreams, commonly in association with *Phragmaticola aedon*. It hops about the undergrowth singly, incessantly uttering its single harsh note 'Tschuk' at intervals of a few seconds, varied occasionally by 'chur-r-r' or 'chr-chr'. It is a great skulker and seldom shows itself.

It is also a winter visitor to Ceylon.

The gonads of all the specimens were in a quiescent state.

Acrocephalus agricola Jerdon. The Paddy-field Warbler.

Specimens not procured.

A single example was flushed in a field of standing paddy in a forest clearing at Thattakād (200 ft.), but its identity remains unconfirmed. It has not been obtained in Travancore or Cochin before, the nearest records being from the Wynaad (Hume, *S.F.*, x, 390) and the pair collected by William Davison in the Brahmagiri Hills, Coorg, in February 1883 now in the British Museum.

Locustella naevia straminea Seeböhm. The Eastern Grasshopper Warbler.

Specimens not procured.

Noted at Marāiyūr (Annemalāi Hills) and Pādāgiri (Nelliampathies). Ferguson (*J.B.N.H.S.*, xv, 456) records a specimen obtained in a swamp in Travancore at 4,000 ft. elevation during April 1901. I procured one in the Biligirirangan Hills (4,500 ft.—Coimbatore District) on 29-12-32.

This species, apparently a winter visitor, was not uncommon on hillsides covered with tall grass (*Andropogon* sp.) interspersed with dwarf date palms above Kodekkādū (near Marāiyūr) at between 5 and 6 thousand feet elevation, especially on the edge of sholas. It was also present in similar facies around Pādāgiri.

The bird was invariably met with singly, uttering 'chek-chek' or 'chur-r, chur-r' from its concealment, something like the notes of Blyth's Reed-Warbler. It is a great skulker and flushed only with difficulty when almost trod upon. After flying a few yards it dives headlong into the grass stems and is well-nigh impossible to flush a second time. So swiftly does it thread its way through the stalks low down near the ground that by the time one reaches the spot where it dived it has vanished mysteriously, and no amount of trampling around will avail!

Orthotomus sutorius sutorius (Pennant). The Tailor Bird.

Specimens collected: 245 [♂] 8-2-33 Thattakād 200 ft.; 616 ♀ juv., 617 ♀ 18-4-33, 634 ♂ 21-4-33 Aramboli 250 ft.; 722 ♀ (imm.) 25-7-33 (Thirūmalāi 100 ft.); 757 ♂ 31-7-33 (Akkūlam 150 ft.); 896 ♂ (imm.) 13-8-33 (Nettāyam 200 ft.) Trivandrum Taluk; 948 ♀ 6-12-33 Nemmāra 300 ft.

Elsewhere noted at: Marāiyūr (3,500 ft.); Kottāyam (ca. S.L.); Peermade (3,200 ft.); Kūmili (3,000 ft.); Rājampāra (1,350 ft.); Trivandrum Town (ca. S.L.); Cape Comorin (ca. S.L.); Chālakūdi; Wadakkācheri (400 ft.); Trichūr; Ernakūlam (ca. S.L.).

Colours of bare parts: *Adult*: Iris and eyelids orange-brown to orange-red; bill, upper mandible excepting commissure horny-brown, commissure and lower mandible pinkish flesh colour; mouth pale flesh colour; legs and feet brownish flesh colour; claws dusky. *Juvenile* (No. 616): Iris pale olive-brown; upper mandible horny-brown, lower mandible pale flesh; gape yellow; mouth pinkish-yellow; legs, feet and claws pale pinkish-flesh.

[Measurements:

| | Bill. | Wing. | Tail. | Tarsus. |
|------|-------|---------|-----------|-------------|
| 4 ♂♂ | 15-16 | 48-51 | 37.5-55 | 19-19.5 mm. |
| 2 ♀♀ | 15-16 | 43-46.5 | 34.5-36.5 | 19 mm. |

It is with considerable hesitation that I attribute this series to the typical race for it is in truth intermediate. In colour the specimens agree with the Indian form *O. s. guzerata* but they are rather small and in that particular agree with the Ceylon bird. Also No. 737 ♂ dated 31 July has the tail in moult and the new feathers appear to be of the long summer type, which suggests that in Travancore as in the typical race of Ceylon the long pointed feathers may be found throughout the year.—H. W.]

The Tailor Bird is a common resident species in Travancore and Cochin, throughout the low country and up to at least 3,500 ft.—probably higher—in the hills. I do not seem to have come across it in the Nelliampathies, but Kinloch (*J.B.N.H.S.*, xxvii, 943) records it as common in those hills.

It frequents scrub and secondary jungle as well as hedges and shrubbery about cultivation and human habitations, being especially fond of the mango and jack-fruit gardens about homesteads along the backwaters.

In the Pālni Hills, Fairbank (*S.F.*, v, 406) records it from Shembaganur 5,500 ft. The typical race, *O. s. sutorius*, is also resident and common in Ceylon.

Breeding: On 15 April (Aramboli) a half-built nest was discovered in a small bush at 18 inches from the ground in fairly open scrub under a Babool grove. Several of the Jamūn-like leaves had been sewn together into a sort of funnel and one of the owners was observed lining it with vegetable down. Specimen No. 616 (18 April) was in juvenile plumage. No. 617 (same date) had enlarged ovarian follicles ca. 4 mm. in diameter and a prominent incubation patch, and was obviously breeding. No. 722 (25 July) had a soft skull and was undergoing post-juvinal moult, while 896 (13 August) also had an imperfectly ossified skull, but had already completed moult into fresh adult plumage.

The evidence shows that the breeding season in Travancore commences in April and probably lasts till the end of May or the middle of June. Ferguson (*J.B.N.H.S.*, xv, 456) says that it breeds in May.

***Cisticola exilis erythrocephala* Blyth.** The Red-headed Fantail-Warbler.

Specimens not procured by the Surveys.

According to Ferguson (*J.B.N.H.S.*, xv, 456) this species is fairly common and resident on grasslands on the High Range in Travancore. Mr. Whistler has examined the following two specimens in the Trivandrum Museum collection: ♂ juv. 25-1-07, ♂ juv. 26-1-07 Devicolam. He measures them as follows:

| | Bill. | Wing. | Tail. | Tarsus. |
|-----------|-------|---------|-------|-------------|
| 2 juv. ♂♂ | 12.5 | 45.5-48 | 51-53 | 18.5-19 mm. |

In the Pālni Hills, Torry (*S.F.*, x, 476) found this warbler very common at Kukul and Kodaikanal. Fairbank (*S.F.*, v, 406) shot a ♂ on Mount Neboos (6,000 ft.) on 12 June and saw two others, while Mr. Howard Campbell also found it common in small colonies in those hills (*Fauna*, ii, 420).

No records of its breeding in Travancore or Cochin apparently exist.

***Cisticola juncidis salimathi* subsp. nov.** The Travancore Streaked Fantail-Warbler.

Specimens collected: 79 ♀, 80 ♀ (imm.), 81 ♀ (imm.), 82 ♂ 13-1-33 Marāiyūr 3,500 ft.; 357 o? 358 ♂ 25-2-33 Peermade 3,200 ft.; 382 ♀, 383 o? 384 ♀ 1-3-33 Kūmili 3,000 ft.; 508 ♂, 509 ♀, 510 ♂, 511 o? 5-4-33 (Velayāni Lake) Trivandrum Environs; 570 o?, 571 o?, 572 ♀ 12-4-33 Cape Comorin ca. S.L.; 623 ♂ 19-4-33 Arāmboli 250 ft.

Elsewhere noted at: Sānthānpāra (3,500 ft.); Kottāyam (ca. S.L.).

Colours of bare parts: Iris pale hazel-brown or pale olive-brown; bill, upper mandible and tip of lower pale horny-brown, commissure and rest of lower mandible pinkish flesh colour; mouth pink, brownish-pink or pale yellowish flesh-colour, in some individuals streaked or blotched with brown; legs and feet pale brownish flesh-colour; claws duskie.

[Additional specimens examined:

Trivandrum Mus. Coll.: ♂ ♀ 9-3-02 Trivandrum; ♂ 10-8-01, ♀ 8-8-01 Cape Comorin.

Measurements:

| | Bill. | Wing. | Tail. | Tarsus. |
|---------------|---------|-----------|---------|-------------|
| 5 ♂♂ (summer) | 10.5-11 | 51-55.5 | 33-34 | 19 mm. |
| 6 ♂♂ (winter) | 10.5-11 | 47-52.5 | 37-40 | 18.5-19 mm. |
| 3 ♀♀ (summer) | 11-11.5 | 45.5-48.5 | 33-36.5 | 18-19 mm. |
| 4 ♀♀ (winter) | 11-11.5 | 46.5-48.5 | 35.5-40 | 17-18 mm. |

At the time when I was writing the account of this species in the Eastern Ghats Survey (*J.B.N.H.S.*, xxxvi, 564) no specimens of the Streaked Fantail Warbler were available from Travancore for examination. Mr. Sálím Ali's fine series has now revealed the interesting point that this species has developed one of the peculiar dark Travancore races which we have found in so many other species. Compared with birds from North India, the Travancore series appears very 'saturated' and richly coloured, both on the upper surface and below. The rumps are bright reddish-brown and the flanks are washed with bright rufous. The small beak immediately separates the Travancore birds from the Ceylon race. I have submitted our birds to Rear-Admiral Hubert Lynes, the well-known monographer of this genus, and he agrees with the recognition of this well-marked race from the rain area. I have accordingly much pleasure in naming it after Mr. Sálím Ali in recognition of his valuable work in carrying out the Travancore Survey. The type No. 358, ♂ adult in winter plumage, 25 February 1933, Peermade 3,200 ft., has been deposited in the British Museum.—H. W.]

The Streaked Fantail Warbler is a common resident species in Travancore and found in suitable localities throughout the low country as well as up to at least 5,000 ft. in the hills. Standing paddy fields and areas under tall grass, especially on water-logged ground as on the margins of Periyár Lake and in the swampy depressions or 'valleys' among the hilltops at Wúndamet, seldom fail to attract it whilst it also frequents the grass-covered hillsides everywhere. Curiously enough I seem to have missed recording it in Cochin though there is no reason to doubt its occurrence there.

Though usually met with singly and never in flocks, it was not uncommon to find 10 or 15 birds gregariously in the same patch of grassland. They were also observed at times to alight on the ground, on bunds, etc. and hop about like *Munias*, presumably after insects. What were evidently courtship displays were in progress between January and March. A bird (♂?) launches from its perch near the tip of an upstanding grass-blade or reed, rises in the air for about 50 or 60 ft. in irregular wavering zigzags, and flies about in the same irregular undulations and wave crests in no particular direction. It closes its wings on each descending curve and flaps rapidly a few times on the upward curve. The actions are reminiscent of a Black-bellied Finch Lark. Just at the bottom, before commencing the upward curve, it utters a single 'chip' like the snip of a barber's scissors heard in the distance. This is repeated about once every second and is also uttered from a perch at the same intervals. After flying about aimlessly in this manner for two or three minutes, the bird descends to a perch some distance away or in the same neighbourhood.

It has not been recorded from the Pálni Hills, but it is likely that some at least of Terry's notes thence (*S.F.*, x, 476) on *Cisticola c. erythrocephala* refer to this species.

In Ceylon it is represented by the race *C. j. omalura*.

Breeding: Apparently nothing is on record as regards the breeding season in this area. Of the specimens obtained by the Survey, Nos. 80 and 81 (13 January) were immature with imperfectly ossified skulls. No. 82 (same date and in the same paddy-field) had testes enlarged to 4×3 mm. and it was in worn breeding plumage. None of the others showed any gonadal development.

From his examination of the specimens, Admiral Lynes concludes that the breeding season in Travancore is probably from August until March.

***Franklinia gracilis albogularis* (Walden) ? The Coorg Wren-Warbler.**

Specimens collected: 195 ♂ (imm.) 30-1-23 Sánthanpára 3,500 ft.; 241 ♂ 8-2-33 Thatákád 200 ft.; 367 ♂, 368 ♂ 27-2-33, 389 ♀ 3-3-33 Kúmilí 3,000 ft.; 466 ♂ 18-3-33 Rájampára 1,350 ft.; 649 ♂ 23-4-33, 655 ♀ 25-4-33 Balamore Estate 2,000 ft.

Elsewhere noted at: Úrúmbikera Reserve Forest (near Múndakáyam); Wadakkáncheri (400 ft.); Pádagiri (3,000 ft.—Nelliampathies).

Colours of bare parts: *Adult:* Iris straw colour; bill black, horny at chin; mouth slaty-brown and pink or pinkish-brown; legs and feet brownish flesh colour; claws horny-brown. *Immature* (No. 195): Iris orange straw;

bill dark horny-brown, paler at commissure and gape. Mouth pale yellowish cream colour with slaty blotches; legs and feet yellowish flesh colour; claws horny-brown.

[Additional specimens examined:

Trivandrum Museum: ♂ 30-8-03, ♀ 3-8-03 Konni; o? 2-8-00, oo juvs. 27-7-00 Ponnudi.

Brit. Mus.: o? 15-3-75 Elgugand (Bourdillon).

Measurements:

| | Bill. | Wing. | Summer tail. | Winter tail. |
|------|-------|---------|--------------|--------------|
| 4 ♂♂ | 12-13 | 46-46.5 | 45-47 | 46 mm. |
| 1 ♀ | 13 | 44 | 39 | — mm. |

N.B.—Nos. 195 and 367 both appear to me to be in moult from juvenile to first winter plumage so they are omitted from the measurements.

In the Eastern Ghats Report (*J.B.N.H.S.*, xxxvi, 564) I suggested that this species would probably prove to have races when better material was available. This has been confirmed though my additional material is not quite sufficient yet to allow me to work out the question fully for the whole of the range.

First of all I am definitely of the opinion that the Ceylon bird requires separation on the grounds that the summer and winter plumage are alike, both being of the type which in continental India is the breeding plumage, i.e. dark above with a grey pectoral band. The tail is the same length in both seasons and the juvenile plumage resembles that of the adults in the possession of the pectoral band. This similarity between summer and winter plumage in Ceylon is an interesting parallel with the cases of *Prinia sylvatica calida* and *P. inornata insularis* in Ceylon, already described in the Eastern Ghats Survey. The name for this race is evidently *Prinia pectoralis* Legge, *Ceylon Blue Book*, 1874, p. 9—Hambantota District, Ceylon.

The Travancore bird also requires separation. It has a definite summer and winter plumage, and the particular interest of this form lies in the fact that the pectoral band, distinct as in other continental forms in summer plumage, is also adumbrated in the winter plumage, thereby connecting the extreme difference of the continental Indian and insular Ceylon forms. The upper parts and wings are considerably darker and more saturated in winter plumage than in the winter plumage of the typical form. The upper parts may also be darker in summer plumage, but summer plumage wears and bleaches so rapidly in this species that I cannot speak positively on the point without a larger series. There is no existing name available for the Travancore race but it is possible that Coorg birds are sufficiently close to it to allow the name *Prinia albogularis* Walden, *Ann. Mag. N.H.*, 1870, vol. v, p. 219—Coorg to apply to both. The only two specimens in existence from Coorg however are two summer birds and these do not allow the point to be settled.—H. W.]

Franklin's Wren-Warbler is a common resident species in the Travancore-Cochin area, being met with by the Surveys both in the low country and in the hills up to about 5,000 ft. Ferguson (*J.B.N.H.S.*, xv, 457) states that it occurs at all elevations. It does not enter evergreen sholas but frequents the patches of tall grass, scrub and deciduous jungle on the hillsides which often alternate with them, and also similar facies in the low country. It usually keeps in small parties of 3 to 5 birds, but flocks of 10 or 12 may sometimes be seen. They are active, restless little birds for ever on the move, and in tall grass country their presence is usually proclaimed by their tinkling calls as they hop about among the stems. One seldom gets a glimpse of them unless an individual momentarily clammers up to the top or as they fly from one thicket to another. They were much more in evidence with the approach of the breeding season when males constantly clambered up on to exposed perches on bushtops or grass and uttered their 'chipping' song.

The birds were observed feeding regularly on nectar from the blossoms of *Erythrina lithosperma* shade trees in abandoned tea clearings overgrown with tall grass and bushes.

This Wren-Warbler does not appear to have been recorded in the Pálni Hills. In Ceylon it is represented by another race, *F. g. pectoralis*, with a local distribution.

Breeding: The Surveys found that at the end of April (Ashámbū Hills 2,000 ft.), the birds were either breeding or ready to do so. In No. 649 (23 April—fresh summer plumage) the testes had enlarged to 4×3 mm., while No. 655 (25 April also in fresh summer plumage) had a soft ovarian egg.

According to T. F. Bourdillon (*J.B.N.H.S.*, xv, 457) the breeding season in Travancore is May, June and July, the birds preferring elevations between 300 and 1,000 ft. above sea level for the purpose.

Schoenicola platyura (Jerdon). The Broad-tailed Grass-Warbler.

Specimens collected: 334 [♂] 22-2-33, 355 ♂, 356 o? 25-2-33 Peermade 3,200 ft.; 399 [♀] 5-3-33, 413 ♀ 7-3-33 Kūmili 3,000 ft.; 438 ♂, 439 ♀ 11-3-33 Camp Derāmalāi 4,000 ft.; 660 ♀, 661 ♂, 662 ♂ 25-4-33 Mūthūkūzhi, Ashāmbū Hills—3,500 ft.; 1053 ♂, 1054 ♂, 1055 ♂ 23-10-33 Peermade 3,200 ft.

Elsewhere noted at: Sānthanpāra (3,500 ft.—Cardamom Hills).

Absent on *Andropogon* grass-covered hillsides between 3,000 and 4,500 ft. on the Nelliampathy Hills (16-20 December 1933) although facies apparently suitable!

Colours of bare parts: Iris brownish-grey, greyish-olive or olive brown; bill, upper mandible horny-brown, lower horny-grey or flesh colour; mouth yellowish-pink, paler in some individuals and stippled with brown in others; gape yellowish cream colour or yellow; legs, feet and claws greyish-brown.

[Additional specimens examined:

B.N.H.S. Coll.: ♂ 30-5-96 Kodaikanal (Cook).

Brit. Mus. Coll.: ♂ ♀ 6-4-01, ♂ 5-4-01 Muthukaly [Mūthūkūzhi ?] (Ferguson); ♂ ♂ ♀ 17-4-80 Colathoopalay [Kulattūpūzha] Patnas 4,000 ft. (Bourdillon—Hume Coll.); ♀ 18-4-77 same locality 3,800 ft. (Bourdillon); ♂ 25-6-81 Pálnis 5,000 ft. (Fairbank); ♂ 26-4-83 Pittur, Pálnis (Terry).

Measurements:

| | Bill. | Wing. | Tail. | Tarsus. |
|------|---------|---------|-------|-------------|
| 8 ♂♂ | 13.5-16 | 64.5-69 | 71-73 | 21-23 mm. |
| 4 ♀♀ | 13-14 | 63-64.5 | 63-66 | 21-21.5 mm. |

In the *New Fauna*, ii, p. 436, Mr. Stuart Baker has given a note on the possibility of there being two races of this bird in its limited distribution on the Western Ghats from South Travancore to Belgaum. He bases the possibility on the two items of size and colour. With regard to size, he states that birds from Travancore and Ceylon measure 63 to 67 in length of wing and birds from Belgaum 66 to 71 mm. I measure the Belgaum series as follows:

| | Bill. | Wing. | Tail. |
|------|---------|---------|---------------|
| 5 ♂♂ | 14-15 | 70-72 | 65.5-73.5 mm. |
| 2 ♀♀ | 14-14.5 | 66.5-67 | 61.5-64.5 mm. |

Compared with our Travancore series there is evidently no ground for separating birds from the two areas on size.

As regards colour, this point could not be settled on the British Museum series even when augmented by Mr. Sālim Ali's fine collection. The Belgaum birds were all collected in September and they are in very worn and faded dress, whereas all the Travancore birds were collected from February to April and are evidently in much fresher plumage after the complete moult which must take place in the winter. Mr. Pillai, however, very kindly made a special point of collecting three males for us in October on Peermade, so that they should be in a state of plumage comparable with the Belgaum series. These prove to be dull and faded before the approaching moult and cannot be separated from the Belgaum birds. The possibility of two races has therefore been thoroughly disposed of.—H. W.]

The Broad-tailed Grass-Warbler is common in the Travancore Hills between about 3 and 4,000 ft. Ferguson (*J.B.N.H.S.*, xv, 457) did not meet with

it at Peermade or on the High Range, though the Survey found it not uncommon in the former locality. It frequents tall grass-covered hillsides, often steep and precipitous, and is particularly fond of the marshy or moist flat depressions among the hilltops overgrown with thin matted grass or reeds as about Wundamet in the Cardamom Hills and at Camp Deramalai. It is an inveterate skulker and all that has been written about the habits of the Streaked Grass-hopper Warbler applies to it in every detail. In patches where it occurs I found its population to be not denser than about one bird—or more rarely a pair—to an acre, and the individuals always keep widely scattered. In the mornings usually while the grass is still heavily sodden with dew, and also in the late afternoons about sunset, single birds were occasionally observed clambering up the grass stems to exposed situations near the tips and uttering a feeble 'pink, pink', etc. somewhat similar to but louder than that of the Red Munia (*Amandava*). The flight is indirect and top-heavy like that of *Prinia* or *Cisticola*, and the broad graduated tail conspicuous on the wing.

Neither Fairbank nor Terry record this species in their Pālni lists though specimens collected by them in those hills are now in the British Museum.

In Ceylon it is believed to occur, but rarely.

Breeding: No nests appear to have been taken in Travancore. Bourdillon considered that they were breeding there in April and this presumption is partly supported by the evidence obtained by the Survey. Specimen No. 661 (25 April—fresh plumage) had testes enlarged to 6×4 mm. and in No. 662 (same date—undergoing complete moult) they measured 6×3 mm. and suggested that the birds were breeding or about to. The organs in all the 3 October specimens were enlarged to breeding condition. In Belgaum, Col. A. E. Butler and Mr. T. R. Bell took many nests in September. Is it double-brooded or is there no definite season?

Phragmaticola aëdon (Pallas). The Thick-billed Warbler.

Specimens collected: 68 ♀ 12-1-33 Marāiyūr 3,500 ft.; 154 ♀ 25-1-33 Sānthānpāra 3,500 ft.; 225 ♀ 6-2-33, 252 ♀ 9-2-33 Thattākād 200 ft.; 450 ♀ 17-3-33, 460 ♂ 18-3-33 Rājampāra 1,350 ft.; 967 ♂ 12-12-33 Pādāgiri 3,000 ft.

Elsewhere not noted.

Colours of bare parts: Iris hazel-brown to olive-brown; upper mandible horny-brown, lower yellowish flesh colour; gape and mouth bright orange yellow; legs and feet plumbeous; claws horny-brown.

[Measurements:

| | Bill. | Wing. | Tail. | Tarsus. |
|------|---------|---------|---------|-----------|
| 3 ♂♂ | 19.5-21 | 84.5-86 | 88-90.5 | 27-29 mm. |
| 5 ♀♀ | 18-20.5 | 78.5-84 | 83-87 | 26-29 mm. |

All the Survey specimens are of the fulvous-brown type of colouration.—H. W.]

Ferguson says (*J.B.N.H.S.*, xv, 457) that in Travancore 'it is a very occasional winter visitor. I have only one specimen shot at the foot of the hills'. In view of this statement it is interesting to record that the Surveys found this species fairly common between 12 December and 18 March in suitable localities, at elevations from 200 up to 3,500 ft. in both Travancore and Cochin. Its favourite haunts are the patches of tall grass and weeds that so luxuriantly overrun abandoned forest clearings, and the growth of grass tussocks and bracken bushes on water-logged ground in ravines etc. through tea and coffee plantations.

As it hops about the undergrowth it utters a loud, harsh quick-repeated 'tschuck, tschuck' and 'chr-r' etc., the latter like the agitated notes of the Black-headed Babbler (*Rhopocichla*), but louder. These calls are sufficiently distinctive, with a little practice, to proclaim its identity long before a glimpse of their skulking producer can be obtained.

It has not been recorded from the Pālni Hills or from Ceylon.

Hippolais rama rama (Sykes). Sykes' Tree-Warbler.

Specimen collected: 543 ♀ 8-4-33 Cape Comorin ca. S.L.

Elsewhere not noted: Possibly confused with *Aerocephalus dumetorum*.

Colours of bare parts: Iris olive-brown; fine rim round eye (eyelids) magenta; upper mandible horny-brown, lower pinkish flesh colour; mouth orange-yellow; legs, feet and claws brownish flesh colour.

This species is apparently a fairly common winter visitor to Southern India but I do not record sight observations as it is not easy to differentiate it with certainty in the field from the commoner *Acrocephalus dumetorum*, while the habits and call notes of the two are also practically indistinguishable. The specimen was in fresh plumage and very fat, suggesting that it was ready to emigrate.

Curiously enough the only other example recorded from Travancore (*J.B.N.H.S.*, xv, 457) was also obtained at Cape Comorin (December 1901).

***Phylloscopus affinis* (Tickell).** Tickell's Willow-Warbler.

Not procured or noted by the Surveys, but Ferguson (*J.B.N.H.S.*, xv, 457) records specimens obtained during the winter months from the High Range of Travancore at 6,000 ft. elevation—never in the plains.

In the Pālmi Hills it is apparently common at Pulungi and one collected by Fairbank on 3 April is now in the British Museum. It does not seem to migrate as far south as Ceylon.

[*Phylloscopus inornatus humei* (Brooks). Hume's Willow-Warbler.

Not procured by the Surveys, neither is it mentioned in Ferguson's Travancore list nor in those of Fairbank and Terry for the Pālmi Hills. On what authority it is stated in the *Fauna* (ii, 469) to extend in winter as far south as Travancore is not known.]

***Phylloscopus nitidus nitidus* Blyth.** The Green Willow-Warbler.

Specimens collected: 25 ♂ 7-1-33, 94 ♂ 14-1-33 Marāiyūr 3,500 ft.; 235 ♀ 7-2-33, 244 o? 8-2-33 Thattākād 200 ft.; 447 ♂ 16-3-33 Rājampāra 1,350 ft.; 920 ♂ 29-11-33 Wadakkāncheri 400 ft.; 1019 o? 26-12-33 Karūpa-danna ca. S.L.

[There is a specimen with no data from Mynall in the British Museum by Bourdillon.

Measurements:

| | Bill. | Wing. | Tail. | Tarsus. |
|------|---------|-------|---------|---------------|
| 4 ♂♂ | 12-13.5 | 63-67 | 48-49.5 | 19-19.5 mm. |
| 1 ♀ | 13 | 62.5 | 48 | 18 mm.—H. W.] |

***Phylloscopus nitidus viridanus* Blyth.** The Greenish Willow-Warbler.

Specimens collected: 119 ♂ 20-1-33 Mānnār 5,000 ft.; 365 ♀ 27-2-33 Kūmili 3,000 ft.

[Measurements:

| | Bill. | Wing. | Tail. |
|-----|-------|-------|--------------|
| 1 ♂ | 14 | 64 | 48 mm. |
| 1 ♀ | 13 | 58 | — mm.—H. W.] |

Elsewhere noted at: Kottāyam (ca. S.L.); Peermade (3,200 ft.); Tenmalāi (500 ft.); Chālakūdi; Kūriārkūtti (1,600 ft.); Nemmāra (300 ft.); Pādāgiri (3,000 ft.).

Colours of bare parts: Iris brown; bill, upper mandible and tip of lower horny-brown, commissure and rest of lower mandible pale flesh colour; mouth pale yellow and greyish-pink, or yellow; in some individuals gape also yellow; legs and feet greenish-grey or pale horny-brown; soles yellowish.

I treat these two forms together as I am totally unable to distinguish them in the field. The call-notes of the Willow-Warblers once ascertained by properly authenticated specimens, appear to me to be the most satisfactory guide to distinguishing many of the confusing species in life, but in the case of these two they are so similar that this method fails.

Both the Green and the Greenish Willow-Warblers are common winter visitors to Travancore and Cochin, the low country as well as to at least 5,000 ft. up in the hills. The latest record I have is 27 March by which date the majority of birds had certainly departed. Ferguson (*J.B.N.H.S.*,

xv, 458) shot two specimens as late as July and suggests that some may remain through the summer.

They are usually met singly hopping about amongst undergrowth and the foliage of trees both in deciduous and, to a lesser extent, in evergreen jungle, uttering a merry, penetrating 'chi-wee' at intervals of a few seconds. The Surveys also found them invariably present among the fruit gardens about backwater homesteads and in wooded compounds of the larger towns.

They have apparently not been recorded from the Pālñi Hills where they must doubtless occur. Both forms are also winter visitors to Ceylon, the latter having occurred in the island in March.

Phylloscopus magnirostris Blyth. The Large-billed Willow-Warbler.

Specimens collected: 165 ♂ 26-1-33 Sānthanpāra 3,500 ft.; 328 ♀ 22-2-33 Peermade 3,200 ft.; 862 ♂? 14-11-33 Kāriārkūtti 1,600 ft.

Elsewhere noted at: Kūmili (3,000 ft.—Periyār Lake Environs); Kūvalle Incline (Cochin Forest Tramway); Chālakūdi; Wadakkāncheri (400 ft.); Pādāgiri (3,000 ft.—Nelliampathy Hills).

Colours of bare parts: Iris hazel brown; bill horny-brown, pale flesh colour at gape, chin, commissure and tip of lower mandible; mouth pale pinkish-yellow; legs, feet and claws greyish-brown or brownish-slate.

[Additional specimen seen:

Brit. Mus. Coll.: ♀ 15-11-74 Mynall (Bourdillon).

Measurements:

| | Bill. | Wing. | Tail. | Tarsus. |
|-----|-------|-------|-------|-----------------|
| 1 ♂ | 15 | 73 | 54 | 19 mm. |
| 1 ♀ | 14.5 | 62.5 | 47.5 | 18.5 mm.—H. W.] |

The Large-billed Willow-Warbler is also a common winter visitor to this area, the latest date I have being 7 March. In my experience it is far more partial to evergreen forest than the two foregoing, and commoner than either the Green or the Greenish Willow-Warbler in the sholas (up to 4,000 ft. !). William Davison (*Ibis* 1883, pp. 146-7) also found it very common 'in the Travancore Hills'. In the short time he was there he collected 19 specimens and says he could easily have got 50 more.

The call-note is a mousy, interrogative 'wee-chi?', besides which a short feeble song was occasionally heard.

It has not been recorded from the Pālñi Hills. In Ceylon it is a winter visitor.

Phylloscopus occipitalis occipitalis (Blyth). The Large Crowned Willow-Warbler.

Specimens collected: 124 ♂ 22-1-33 Sānthanpāra 3,500 ft.; 372 ♂? 28-2-33 Kūmili 3,000 ft.; 430 ♀ 9-3-33 Camp Derāmālāi 3,000 ft.; 981 ♂ 15-12-33 Pādāgiri 3,000 ft.

Elsewhere noted at: Thattākād (200 ft.).

Colours of bare parts: Iris brown; bill, culmen brown, commissure, tip and lower mandible pale orange-yellow; mouth pale yellow; legs, feet and claws greyish-brown or brownish-slate; soles pale yellow.

[Measurements:

| | Bill. | Wing. | Tail. | Tarsus. |
|------|---------|-------|-------|---------------|
| 2 ♂♂ | 13-13.5 | 66-68 | 54 | 17 mm. |
| 1 ♀ | 13.5 | 61 | 45 | 19 mm.—H. W.] |

A common winter visitor to Travancore and Cochin. Last noted 9 March. This Warbler is confined to evergreen forest mostly on the hills between 3 and 4,000 ft. elevation, but it also occurs in this biotope in the low country. Unlike the preceding 3 species, it is gregarious in its habits and moves about in active flocks of from 10 to 30 birds amongst the foliage of lofty trees in sholas, searching the sprigs for insects. They were invariably found in association with other small birds such as *Culicicapa*, *Zosterops*, *Machlolophus*, *Muscicapula pallipes* and *Alcippe poioicephala*.

It has not been recorded from the Pālñi Hills or from Ceylon.

Prinia socialis socialis Sykes. The Ashy Wren-Warbler.

Specimens collected: 147 ♂ 24-1-33 Sānthānpāra 3,500 ft.; 351 ♂ 24-2-33 Peermade 3,200 ft.; 407 ♂ 5-3-33, 416 ♂ 7-3-33 Kūmili 3,000 ft.; 431 ♀ 10-3-33 Camp Derāmalāi 3,000 ft.

Elsewhere noted at: Rājampāra (1,350 ft.); Balamore Estate (2,000 ft.—Ashāmbū Hills).

Noted as absent in Cochin at the following places: Kūriārkūtti (1,600 ft.); Wadakkācheri (400 ft.); Nemmāra (300 ft.); Pādāgiri (3,000 ft.); Trichūr.

[Additional specimen examined:

Trivandrum Museum Coll.: ♂? 2-1-04 Arnakal.

Measurements:

| | Bill. | Wing. | Tail. | Tarsus. |
|------|-------|---------|-------|-------------|
| 4 ♂♂ | 14 | 48-50.5 | 60-65 | 20-20.5 mm. |
| 1 ♀ | 14.5 | 46 | 55 | — mm. |

All specimens in winter plumage.—H. W.]

The Ashy Wren-Warbler is a resident species in Travancore, not uncommon where it occurs, but curiously patchy in its distribution. During the whole of the Cochin Survey it was noted as 'absent'. It frequents tall grassland on the hillsides (between 1,500 and 3,500 ft.!) and was not observed in the low country at all though Ferguson states (*J.B.N.H.S.*, xv, 458) that it is found in suitable localities there. At Wūdāmet in the Cardamom Hills (ca. 3,000 ft.) it was common among the matted grass and reedbeds in the water-logged hollows or 'valleys' where the birds appeared to have concentrated owing to the burning of the grass on the surrounding hilltops.

Fairbank (*S.F.*, v, 406) obtained a specimen on a grassy hillside at 6,000 ft. in the Pālni Hills, but he does not say anything about its numbers there. Terry says (*S.F.*, x, 476) that it is not uncommon on the slopes in the long grass near Pulungi and Pittur. It is represented in Ceylon by the slightly smaller and shorter tailed race *P. s. brevicauda* Legge.

Breeding: The gonads of all the Survey specimens were in normal non-breeding condition. According to T. F. Bourdillon (*J.B.N.H.S.*, xv, 458) this Wren-Warbler 'breeds [in Travancore] most abundantly on the lower slopes of the hills in May and June and also in July'.

Prinia sylvatica sylvatica Jerdon. The Jungle Wren-Warbler.

Specimens collected: 627 ♂ 19-4-33, 630 ♂ 20-4-33, 639 ♂, 640 ♀ 21-4-33 Arāmboli 250 ft.

Elsewhere not noted.

Colours of bare parts: Iris bright brownish-yellow or orange-brown; rim round eye (eyelids) paler; bill blackish-brown, paler at chin and on gonys; mouth brownish-slate or pink with brownish streaks; legs and feet brownish flesh colour; claws horny-brown.

[No other specimens seen.

Measurements:

| | Bill. | Wing. | Tail. | Tarsus. |
|------|-----------|-------|---------|-------------|
| 3 ♂♂ | 14.5-16.5 | 61-62 | 67-67.5 | 22-23.5 mm. |
| 1 ♀ | 14 | 53.5 | 57.5 | — mm. |

All in winter plumage. These are the first specimens I have seen from Travancore and they agree definitely with the typical form and not the Ceylon race.—H. W.]

The Jungle Wren-Warbler has apparently not been recorded from Travancore before. The Survey met with it only at Arāmboli at the southern end of the Ashāmbū Hills and on the western extremity of the gap or pass through the Ghats leading into the drier district of Tinnevely (Madras Presidency). It frequented steep boulder-strewn hillsides with sparse cactus and thorn bushes where males were constantly observed perching on the boulders or in exposed positions on bushes and warbling 'Pretty-pretty', etc. reminiscent of a Tailor-bird's call, but louder and easily distinguishable from it. It

was repeated for three minutes or more at a stretch and resumed after a pause of two or three seconds. Each 'pretty' of the song is preceded by a curious subdued ventriloquistic 'pit' uttered in a different key. The birds were extremely wary and difficult to approach. Their absence from the rest of Travancore and from Cochin suggests that their habitat is confined to broken, boulder-covered hills with sparse and stunted vegetation, a facies which does not occur elsewhere within the area.

It has not been recorded in the Pāl̄ni Hills. The race *P. s. valida* represents it in Ceylon.

Breeding: From the excited behaviour of the birds at the time (middle to end April) it was evident that they were nesting. No. 627 (19 April) had testes enlarged to 6×4 mm. and on the same date another bird was observed carrying building material. In No. 639 (31 April) the testes measured 5×4 mm. Its pair, 640, had probably finished laying but there was a conspicuous incubation patch present. From the agitated behaviour of this pair—hopping about the bushes and uttering 'pit-pit-pit-pit', etc.—it was clear that they had a nest (or young ?) in the neighbourhood.

Prinia inornata franklinii Blyth. The South Indian or Nilgiri Wren-Warbler.

Specimens collected: 194 ♀ (imm.) 30-1-33 Sānthanpāra 3,500 ft.; 241 ♂, 242 ♂ 8-2-33, 276 ♀ (imm.) 12-2-33 Thattākād 200 ft.; 284 ♂, 285 ♀ 15-2-33 Kottāyam ca. S.L.; 389 ♀ 3-3-33 Kōmili 3,000 ft.; 434 ♀ 10-3-33 Camp Derāmalāi 3,000 ft.; 1005 ♂ 25-12-33, 1016 ♂ 26-12-33, 1050 ♀, 1051 ♂ 31-12-33 Karūpadanna ca. S.L.

Elsewhere noted at: Peermade (3-4,000 ft.); Wadakkācheri (400 ft.—only 1 in a paddy-field; unconfirmed !); Nemmāra (300 ft.—very scarce).

Colours of bare parts: **Adult:** Iris and eyelids brownish-yellow or orange-straw colour; bill, upper mandible and tip of lower horny-brown, rest of lower mandible pale flesh colour; mouth blackish-brown, brownish flesh colour or pale pink with brownish streaks and blotches (probably seasonal); legs and feet brownish flesh colour; claws dusky. **Immature:** Iris pale khaki; gape and eyelids yellow; mouth pinkish-yellow; legs and feet as in adult but with a pinkish flush.

[Measurements:]

| | Bill. | Wing. | Summer tail. | Winter tail. |
|------|-----------|---------|--------------|--------------|
| 4 ♂♂ | 13.5 | 47-50.5 | 53-55.5 | — mm. |
| 2 ♀♀ | 12.5-13 | 48.5-49 | 50.5-51 | — mm. |
| 3 ♀♀ | 12.5-13.5 | 46-49 | — | 57.5-63 mm. |

Nos. 241, 242, 284, 285, 1005, 1016, 1050 and 1051 are all in breeding plumage which is evidently assumed by a complete pre-nuptial moult about December. Nos. 194, 276, 389 and 434 are either birds in juvenile plumage or in their first winter plumage, evidently agreeing with the adult winter plumage in colour and greater length of tail. The series has therefore satisfactorily cleared up the point—shown in the Eastern Ghats Survey, *J.B.N.H.S.*, xxxvi, 577, as obscure—that in this race the relationship between the summer and winter plumages¹ is in line with that of the other continental forms and not as in the Ceylon race. These plumages are much darker and browner than in the typical race with the tail markings more distinct. The difference between them of course accounts for Ferguson's belief that two forms of this Wren-Warbler were to be found in Travancore.—H. W.]

This Wren-Warbler is common among the grassy bunds and paddy-fields about the backwaters both in Travancore and Cochin, and is also found to a lesser extent in undulating grassland in deciduous country and on the hills in similar facies up to at least 4,000 ft. elevation. Ferguson (*J.B.N.H.S.*, xv, 459) found it up to 6,000 ft. ("*P. jerdoni*"). I did not come across it in the Nelliampathy Hills at all. Its distribution is patchy and capricious, the birds being absent from many areas to all appearances eminently suited to them.

In the Pāl̄ni Hills, Fairbank (*S.F.*, v, 406) observed it chiefly above 5,000 ft. elevation in long grass and fern thickets. In Ceylon it is represented by the race *P. i. insularis* (Legge).

¹ Or more intelligibly in Travancore 'breeding and non-breeding plumages.'

Breeding: The earliest date on which nesting activity was noted was 8 December (Nemmāra) when a bird was observed carrying building material—a strip of paddy leaf. No. 1016 (26 December) had its testes enlarged to 6×4 mm. and it was undergoing complete pre-nuptial moult. Nos. 194 (30 January) and 276 (12 February) were immature with imperfectly ossified skulls and evidently lately out of nest. In 285 (15 February) the ovarian follicles measured 1.1-1.5 mm. At this time males were warbling excitedly from exposed perches on grass or paddy stems and chasing each other about. An individual was observed carrying a green caterpillar in its bill and from all these signs it was obvious that breeding was in progress.

From the evidence obtained, the breeding season in Travancore-Cochin appears to be earlier than that given for the Nilgiris (March to July), but how long it continues here is not known. The two specimens obtained on the hills in March had undeveloped gonads.

FAMILY: IRENIDÆ.

Irens puella puella (Latham). The Fairy Blue-bird.

Specimens collected: 28 ♂, 29 ♀ 7-1-33 Marāyūr 3,500 ft.; 462 ♂ 18-3-33 Rājampāra 1,350 ft.; 971 ♂ 12-12-33, 975 (not sexed—alcohol sp.) 13-12-33, 979 (not sexed—alcohol sp.) 14-12-33 Pādagiri 3,000 ft.

Elsewhere noted at: Sānthānpāra (3,500 ft.); Thattākād (200 ft.); Ūrāmbikera Reserve Forest (ca. 1,000 ft.—near Mūndakāyam); Peermade (3,200 ft.); Kūmili (3,000 ft.—Periyār Lake Environs); Tenmalāi (500 ft.); Balamore Estate (2,000 ft.—Ashāmbū Hills); Kūvalle Incline (Cochin Forest Tramway); Kōriārkūtti (1,600 ft.).

Colours of bare parts: Iris claret or scarlet; bill in ♂ black, in ♀ brownish-black; mouth greyish-pink; legs, feet and claws black.

[Additional specimens examined:

Brit. Mus. Coll.: Ad. ♂♂ 12-12-78, 24-7-78, 20-11-74, 11-11-78 and -10-78; ♀♀ 5-12-78, 29-11-78 Mynall (Bourdillon).

Measurements:

| | Bill. | Wing. | Tail. | Tarsus. |
|----------|---------|-----------|-----------|-------------|
| 9 ad. ♂♂ | 27.5-30 | 124.5-134 | 100-106 | 18-18.5 mm. |
| 3 ♀♀ | 27-30 | 127-127.5 | 101.5-104 | 17.5 mm. |

The juvenile plumage is a dull edition of that of the adult female except that the wings and their coverts have very little of the blue-green wash and the lower parts are dull sooty-black with only a few feathers blue-green. The first primary is softer and rather more rounded than in the adult while the tail feathers are narrower. The first winter male resembles the adult female still more closely, but I have not seen enough material to work out the moults.—H. W.]

The Fairy Blue-bird is a resident of evergreen forest and is found in Travancore and Cochin wherever this biotope occurs both in the low or foot-hills country (cf. Thattākād) and up in the highest sholas. Parties of 7 or 8 birds are commonly met with flying about among the lofty tree-tops uttering a pleasant musical 'weeet-weeet' as they do so. They also occasionally descend into low bushes to feed on various berries. They are very fond of the various species of *Ficus* figs, and flowers of *Erythrina lithosperma* shade trees in coffee estates are regularly visited for the nectar. Two of the specimens shot off these had pollen adhering to their chin feathers. The call-note most usually heard is a rich, mellow, percussive 'Whats it' repeated every few seconds.

Fairbank (*S.F.*, v. 406) records this species as common in the Pālni Hills from their base up to 4,500 ft. In Ceylon it is probably only a straggler.

Breeding: The birds were evidently breeding in March. Specimen No. 462 (18-March) had its testes enlarged to 11×7 mm.; it was in fresh plumage and was observed tugging at dry twigs for a nest.

According to T. F. Bourdillon (*J.B.N.H.S.*, xv, 262) it builds in Travancore at elevations between 500 and 3,000 ft. above sea level from January to May. Kinloch took eggs in the Nelliampathy Hills on 26 February, and

Stewart in Travancore in every month from January to June. Most eggs are said to be found in March and April. The normal clutch is almost invariably 2 eggs, but c/3 has once been taken and one incubated egg is occasionally found (*Nidification*, ii, 497).

FAMILY: ORIOLIDÆ.

Oriolus oriolus kundoo Sykes. The Indian Oriole.

Specimens collected: 269 ♂ 11-2-33 Thattākād 200 ft.; 486 ♀ 24-3-33 Tenmalāi 500 ft.

Elsewhere noted at: Sānthanpāra (3,500 ft.); Kottāyam (ca. S.L.); Kūmili (3,000 ft.); Kūriārkkūtti (1,600 ft.); Wadakkācheri (400 ft.); Neummāra (300 ft.); Pādāgiri (3,000 ft.—Nelliampathies); Trichūr Town; Karūpadanna (ca. S.L.).

Colours of bare parts: Iris brownish-scarlet; bill reddish-brown; mouth pinkish flesh; legs and feet slate; claws horny-brown.

[Other specimens examined:

Brit. Mus. Coll.: ♀ 13-11-78 Trivandrum; ♀ 11-3-77, ♀ 20-12-78 Mynall (Bourdillon).

In the *Ibis* 1916, pp. 56-7, Dr. C. B. Ticehurst made some notes on the plumages of a series of orioles collected by me in Jhelum District, Punjab. That account is now expanded after the examination of a considerable amount of fresh material.

In juvenile plumage (presumably of both sexes), the crown, ear coverts and hind-neck are yellowish-green with an indistinct dusky loreal band; upper parts olive-green with pale tips to the feathers; upper tail coverts bright yellow; wings dark brown, all the lesser and median coverts and the tertiaries washed with olive-green and with pale tips; primary coverts dark brown, the ends of the feathers with well-defined yellow edges; primaries and secondaries dark brown, edged with greyish-white; tail olive-green all but the central pair of feathers with bright yellow tips to their inner webs, broadest towards the outer feathers. The underparts are white, washed with pale yellow on the flanks, all the feathers with dark brown shaft streaks except on the chin and throat; undertail coverts bright yellow.

The post-juvénal moult takes place about August. The male in first winter plumage has the whole of the upper plumage and sides of the head except for an indistinct dusky loreal band, greenish-yellow, brightest on the supercilium and rump and dullest on the wing coverts; the primaries and secondaries, the primary, median, and greater wing coverts and the tail are retained from the juvenile plumage. Lower plumage greyish-white, the sides of the breast, the flanks and the undertail coverts golden yellow, the breast and flanks having broad blackish-brown shaft streaks.

The male in second winter plumage is very similar but the loreal streak is darker and better defined and there is more yellow on the lower plumage. This stage may however be easily recognised by the primary coverts which have their yellow tips much wider and yellower, forming a distinct yellow patch, while the lesser wing coverts are irregularly blotched with brownish-black.

Third winter males are still brighter and yellower on the upper parts; the lower plumage is bright orange-yellow throughout, almost but not quite as clear as in the adult, and the shaft streaks are narrow, indistinct and sometimes absent. The wings now resemble those of the adult being black with a yellow patch on the primary coverts and distinct yellow tips to most of the primaries and secondaries. The lesser and median coverts, the tertiaries and to a lesser extent the secondaries are still, however, much washed with olive-green while the yellow patch on the primary coverts is neither so large nor so pure as in the adult. The tail in this stage is also distinctive; the central pair of feathers is olive-green with black tips and a terminal yellow triangular spot, the amount of yellow in the other feathers being greater than in the last stage.

Finally the adult male plumage—as described in all text-books—is assumed at the fourth autumn. The brown iris of the juvenile has become red by the first summer, the males breeding in their first year in spite of the much longer period necessary for the assumption of full plumage.

The first winter female only differs from the first winter male in having the under plumage whiter, lacking most of the yellow wash on the breast and flanks.

In second winter plumage she appears to be quite indistinguishable from the male of a similar age, while the adult plumage—of the text-books—is assumed in the third winter, that is at the post-nuptial moult at the end of the second breeding season.

The autumn moult is always complete except in the case of the first, viz. the post-juvinal moult when the wings and tail are retained from the juvenile plumage as mentioned above. There appears to be no spring moult.

It is not quite clear to me whether some females attain a plumage similar to that of the adult male. I have seen birds, which on plumage could certainly not be distinguished from adult males, marked as females but there was nothing to show whether the sexing was reliable.¹ There is, however, one adult female in the Scully Nepal Collection in the British Museum which differs from the adult male only in having the central pair of tail feathers green with black tips. This is reliably sexed as there is a drawing of the enlarged ovary on the label.—H. W.]

The Indian Oriole is, as Ferguson observes (*J.B.N.H.S.*, xv, 461) sparingly met with in the low country of Travancore and also in the hills, in my experience up to about 3,500 ft. elevation. According to him it is a resident species. The Survey noted it as most abundant at camps between 25 January and the end of March. By about the middle of April it was not in evidence at all and it seems more than probable that the majority of birds had left. Kinloch (*J.B.N.H.S.*, xxvii, 941) describes it as 'very common' in the Nelliamrathy Hills at what season he does not say, and its status there is presumably the same as in Travancore. The Cochin Survey found it only moderately common at Pädagiri in December.

This Oriole frequents open secondary forest either deciduous or with a mixture of evergreen species, well-wooded compounds and groves of trees about cultivation, and is often met with in the localised bird associations. It was observed feeding largely on Peepal figs (*Ficus religiosa*), Lantana berries and on the nectar of *Erythrina lithosperma* blossoms.

It has apparently not been recorded in the Palni Hills or in Ceylon.

Breeding: The gonads of the specimens were in a quiescent state and no record of its breeding in Travancore or Cochin exists.

Oriolus chinensis diffusus Sharpe. The Indian Black-naped Oriole.

Specimen collected: No. 451 ♀ (imm.) 17-3-33 Rājampāra 1,350 ft.

Elsewhere noted at: Thattākād (200 ft.).

Colours of bare parts: Iris brown, rest as in *kundoo*.

[Measurements:

| Bill. | Wing. | Tail. |
|-------|-------|-----------------|
| 33 | 149 | 93.5 mm.—H. W.] |

This oriole was observed singly in small numbers in secondary mixed deciduous-and-evergreen jungle on the edge of rubber plantations. One was feeding on 'Omé' berries (*Trema orientalis* Blume).

Ferguson (*J.B.N.H.S.*, xv, 461) describes it as an occasional winter visitor to the low country in Travancore and says that he has only one specimen obtained in Trivandrum. Mr. Whistler has examined five further Travancore specimens in the British Museum (Fry, Bourdillon, Anjango) with no more precise data.

¹ It is a straggler in winter to Ceylon.

Oriolus xanthornus maderaspatensis Franklin. The South Indian Black-headed Oriole.

Specimens collected: 690 ♀ imm. 18-7-33 (Pūlayanārkkotta 200 ft.); 745 ♂

¹ I agree with this as I have watched several breeding pairs of adults during the last two seasons (Dehra Dun) in which the male could not be distinguished from the female by colour.—S. A.

imm. 29-7-33 (Küttāni 300 ft.); 832 ♂ ad. 11-8-33 (Pālayanārkotta 200 ft.) Trivandrum Tālūk.

Elsewhere noted at: Marāiyūr (3,000 ft.); Thattākād (200 ft.); Kottāyam (ca. S.L.); Tenmalāi (500 ft.); Trivandrum Town (ca. S.L.); Wadakkāncheri (400 ft.); Nemmāra (300 ft.); Karūpadanna (ca. S.L.).

Colours of bare parts: *Adult*: 'Iris crimson; bill horny pinkish-brown, darker at tip; mouth pale greyish-pink; legs and feet bluish; claws horny-black' (Pillai). *Immature* (Nos. 690 and 745): 'Iris blackish-grey and light blue [?]; bill slaty-black; mouth grey and pink; legs and feet blackish-grey (690), bluish-grey (745); claws horny-brown' (Pillai).

[Additional specimens examined:

Brit. Mus. Coll.: ♂ 19-11-70 Trivandrum (Bourdillon), ♂ undated Trivandrum (Fry), ♂ 8-5-77 Lower Pālnis (Fairbank).

Measurements:

| | Bill. | Wing. | Tail. |
|----------|-------|-------------|---------------|
| 3 ad. ♂♂ | 29-32 | 132.5-139.5 | 83-86.5 mm. |
| 1 imm. ♂ | 29 | 133.5 | 86 mm. |
| 1 imm. ♀ | 26 | 126.5 | 79 mm.—H. W.] |

The Black-headed Oriole is a common resident species in Travancore and Cochin. It is found in the low country, usually under 500 ft. elevation, and excepting Marāiyūr (3,000 ft.)—where it was fairly common in open deciduous forest about the terraced paddy-fields in the valley—it was not met with at all in the hills. Kinloch (*J.B.N.H.S.*, xxvii, 940) also states that it does not occur in the Nelliampathy Hills at any season. In the Pālni Hills, however, Fairbank (*S.F.*, v, 406) met with it from the base up to 5,000 ft. I hazard a guess that Fairbank's statement refers only to the eastern and drier side of the hills where the facies is of a nature more suited to this species.

In Ceylon it is represented by the endemic race *O. x. ceylonensis* Bonaparte.

Breeding: There are no published records of the breeding of the Black-headed Oriole in the Travancore-Cochin area. Two of the specimens obtained by Mr. Pillai at the middle and end of July, however, were immature with—according to the collector—imperfectly ossified skulls. Both of these are in fresh first winter plumage.

Over the greater part of its range, it breeds from February to July—principally April and May (*Fauna*, iii, 12). The Ceylon race, according to Wait breeds in the island from October to May (*Nidification*, iii).

FAMILY: EULABETIDÆ.

Gracula religiosa indica (Cuvier). The Southern Grackle.

Specimens collected: 427 ♂ 9-3-33 Camp Derāmalāi 3,000 ft.; 500 ♂ 27-3-33 Tenmalāi 500 ft.

Elsewhere noted at: Mūnnār (5,000 ft.—Kanan Devan Hills); Sānthanpāra (3,500 ft.—Cardamom Hills); Thattākād (200 ft.); Ūrūmbikera Reserved Forest (ca. 1,000 ft.—near Mūndakāyam); Peermade (3,200 ft.); Kūmili (3,000 ft.—Cardamom Hills); Rājampāra (1,350 ft.—Panthalam Hills); Balamore Estate (2,000 ft.—Ashāmbū Hills); Kūriārkūtti (1,600 ft.—Annema!āi Hills); Pādāgiri (3,000 ft.—Nelliampathy Hills).

Colours of bare parts: Iris brown; bill orange with yellow tip; mouth, palate yellow, gullet pink; wattles and infra-orbital skin bright yellow; legs and feet orange-yellow; claws blackish-brown.

[Additional specimens seen: 3 from Lower Pālnis (Fairbank).

Measurements:

| | Bill. | Wing. | Tail. | Tarsus. |
|------|-------|-----------|-------|-----------|
| 2 ♂♂ | 29-30 | 142.5-149 | 66-67 | 29-31 mm. |

This race also occurs in Ceylon where its exact relationship with the Ceylon Grackle (*Gracula ptilogenys*) is not very clear. Both are birds of very local distribution in the island and in the main their ranges do not appear to coincide. This latter form is usually attributed to a distinct species because of the suppression of the wattle on the ear coverts though a

division in the feathers suggests its comparatively recent suppression. As, however, the variation in the wattles is a subspecific character elsewhere and the ranges of the two birds in Ceylon have possibly been confused by the process of deforestation, it appears probable that *ptilogyns* is in reality nothing more than a race of *religiosa*.—H. W.]

The Grackle or Hill Myna is one of the commonest birds on the forested hills of Travancore and Cochin. The Survey has noted it in evergreen forest as low down as Thattākād (200 ft.) and it also occurs in the forest-clad foothills, but most abundantly at between about 1 and 4 thousand ft. elevation, and in lesser numbers up to at least 5,000 ft. It is partial to the lofty shade trees in cardamom plantations feeding on the ripe fruit of *Calophyllum wightianum* (?) and of the various species of *Ficus* scattered about these sholas, in company with hornbills, barbets, green pigeons and other frugivorous birds. Flocks of up to 20 or more birds are commonly met with. Their wings produce the same whirring sound as green pigeons' and some of their loud, sharp call-notes may easily be mistaken for those of the Black Bulbul (*Microscelis*). They also feed largely on nectar from the flowers of *Bombax malabaricum* in forest, and *Grevillea robusta* and *Erythrina lithosperma* shade trees in tea and coffee plantations. I have frequently observed pollen adhering to their chin and forehead feathers and have no doubt that they assist considerably in the cross-pollination of these species.

One bird of a pair noted at Rājampāra (16 March) had the abdomen and vent white; its mate was normally coloured.

In the Pālmi Hills this Grackle is common up to 4 or 5,000 ft.

Breeding: No. 427 (9 March) had testes enlarged to 8×4 mm. and a conspicuous incubation patch, and was one of a pair. In No. 500 (27 March) the testes measured 8×5 mm. and it also had a prominent incubation patch. On 4 March a pair were observed carrying fine twigs into a hole in a dead tree-trunk standing in the Periyār Lake at a height of about 25 ft. from the surface of the water. On 20 March another pair was observed building in a hollow in a dead tree-trunk on the edge of Lahāi Rubber Estate (Rājampāra) about 40 ft. up. By this time birds were mostly in pairs when not congregated to feed, and breeding was obviously in progress generally.

According to Stewart (*Nidification*, ii, 506) the breeding season in Travancore is February to April—earliest date for eggs 6 February, latest 28 April. He says that in July some birds seem to breed again as he has taken fresh eggs on the 28th of that month. Bourdillon took a nest on 27 May. The full clutch consists of 3 eggs, but sometimes only two are laid.

FAMILY: STURNIDÆ.

Pastor roseus (Linn.). The Rosy Pastor or Rose-coloured Starling.

Specimens collected: 354 ♂ 25-2-33 Peermade 3,200 ft.; 603 ♀, 604 ♂ 16-4-33 Arāmboli 250 ft.; 953 ♂ 7-12-33 Nemmāra 300 ft.

Elsewhere noted at: Thattākād (200 ft.); Kūmili (3,000 ft.).

Colours of bare parts: Iris hazel brown; upper mandible and tip of lower mandible horny-brown, gape and rest of lower mandible pale yellow; mouth, palate yellow, gullet pink; legs, feet and claws horny-brown.

[No other Travancore specimens seen.—H. W.]

Ferguson writes (*J.B.N.H.S.*, xv, 462): 'Found in large flocks both in the low country and on the hills from September to April usually. I have seen them as late as May occasionally.' This conveys the impression that the bird is a common winter visitor, but my experience both in Travancore and Cochin shows that it is decidedly rare and uncommon in these parts. The largest flock noted by the Travancore Survey comprised of about 10 birds; parties of 3 or 4 or single individuals amongst flocks of Grey-headed and Brahminy Mynas was more usual. The two seasons during which these areas were worked did not appear to be exceptional in any way, and therefore my experience and Ferguson's statement seem rather difficult to reconcile. The explanation doubtless is, however, that as in other parts of its winter as well as breeding range its numbers vary considerably from year to year

depending partly upon the abundance or otherwise of food supply, but partly also on factors which as yet we do not know.

The specimens shot or observed were feeding largely on the berries of *Lantana camara* and *Salvadora persica* and also on the nectar of *Bombax* flowers. The stomach of No. 953 (7 December) was crammed full of ripe *Lantana* berries exclusively. 56 seeds were recovered from the guts intact, some of which were on the point of being excreted. As I have noted elsewhere, the Pastor is undoubtedly one of the more important agents in the dispersal of this pernicious weed in India.

This bird has apparently not been recorded in the Pálni Hills. It is an irregular and uncertain winter visitor to Ceylon in small numbers.

***Sturnia malabarica malabarica* (Gmelin). The Grey-headed Myna.**

Specimens collected: 41 ♀ 9-1-33, 97 ♂ 15-1-33 Marāyūr 3,500 ft.; 545 ♂ 9-4-33 Cape Comorin ca. S.L.; 928 ♀ 1-12-33 Wadakkāncheri 400 ft.

***Sturnia malabarica blythii* (Jerdon). Blyth's Myna.**

Specimens collected: 255 ♂ 9-2-33 Thattākād 200 ft.; 453 ♂ 17-3-33 Rājampāra 1,350 ft.; 762 ♂ imm. 31-7-33 (Mārūthānkūzhi 50 ft.); 821 ♂ imm. 9-8-33 (Nettāyam 200 ft.) Trivandrum Taluk.

Elsewhere noted (both forms) at: Kottāyam (ca. S.L.); Kūmili and Periyār Lake Environs (3,000 ft.); Balamore Estate (2,000 ft.—Ashāmbū Hills); Kūriārkkōtti (1,600 ft.).

Colours of bare parts: Iris greyish- or creamy-white; bill yellow at tip, leaden blue at base with a greenish intervening area. In immature birds (Nos. 762 and 821) the green is replaced by brown; mouth, palate dusky yellow, gullet pinkish-grey or slaty; legs, feet and claws yellowish-brown, brownish-flesh or pale lemon yellow.

[Additional specimens seen:

B.N.H.S. Coll.: *malabarica* o? n.d. Thekadi, Travancore (Cook); ♀ 3-2-29 Kalathrupoli, Travancore (M. O. H. Beusley).

Brit. Mus. Coll.: *blythii* o? 9-3-76 Travancore (Bourdillon).

B.N.H.S. Coll.: ♂ 29-9-93 Thekadi (Cook).

The range and status of these two forms in Travancore and Cochin seem utterly confusing and it is impossible to say anything definite regarding them. The difficulty is heightened by the fact that both races may commonly be met with together and even in one and the same flock. Thus No. 928 (*malabarica*) was shot from a party which contained two or three undoubted *blythii*. In addition, there is every inter-gradation of colour between the grey-headed *malabarica* and the white-headed *blythii*, while it is practically impossible to tell females and immature males of the latter from *malabarica*.

On the whole, however, the specimens confirm that *blythii* is probably the breeding form in Travancore and that *malabarica* only appears in this area as a winter visitor. None of the specimens attributed to *malabarica* showed any gonadal development, while No. 255 (9 February—*blythii*) had its testis (only a single!) enlarged to breeding size—13×10 mm.—and 453 (17 March—*blythii*) to 10×7 mm. On 4 March, two pairs were observed building in holes in partially submerged tree-trunks in Periyār Lake which, judging from the males, were undoubted *blythii*. Several other pairs were also noted prospecting for nesting sites here between 28 February and 7 March, all of which seemed to belong to the white-headed form. A half-fledged young was brought in by an urchin on 25 March at Tenmalāi, but its parents were unfortunately not seen.

Specimen No. 545—an adult male *malabarica*—on the other hand showed no genital development on 9 April at which time *blythii* were breeding generally. Moreover it was very fat, a condition which at this season indicates in true migrants their readiness to depart. Whether it can be interpreted in the same light in the case of local migrants, as the Grey-headed Myna seems to be, is of course open to question.

In Travancore and Cochin, these Mynas frequent secondary jungle and the neighbourhood of cultivation usually in the low country and foothills, but also up to about 3,500 ft. elevation. They keep in flocks of 5 to 20 birds or more, and I found them feeding largely on *Lantana* berries, Peepal and

various other *Ficus* figs and the nectar of *Bombax malabaricum* flowers. On these trees they indulge in the same sort of squabbling, chatter and bellicosity as the Rose-coloured Starling. Occasionally they were also observed springing open *Loranthus* buds and probing into them for the nectar.

Fairbank (*S.F.*, v) does not record either of these forms in the Pālñi Hills, but according to the *Fauna* (iii, 41) *blythii* breeds there and is apparently a resident.

This species is not found in Ceylon.

Breeding: On the evidence obtained by the Survey nesting of the white-headed form—*blythii*—in Travancore is in progress during March and April and probably also May.

Col. Sparrow took 2 fresh eggs at Kūmili (Cardamom Hills) on 4 April. He attributes these to the grey-headed typical race, but as he did not shoot the parents, the uncertainty remains.

Stewart and Bourdillon took eggs of *Sturnia m. blythii* in Travancore in March and April (*Nidification*, ii, 519).

Temenuchus pagodarum (Gmelin). The Black-headed or Brahminy Myna.

Specimen collected: 547 ♂ 9-4-33 Cape Comorin ca. S.L.

Elsewhere noted at: Kottāyam (ca. S.L.); Arāmboli (250 ft.); Chālakūdi and in the low country along the Cochin Forest Tramway; Wadakkācheri (400 ft.); Karūpadanna (ca. S.L.).

Colours of bare parts: 'Iris white; bill blue at base, bright yellow at tip; legs, feet and claws yellow' (Humayun Abdulali).

[Additional specimen seen:

Brit. Mus. Coll.: ♂ 6-6-77 Periakulam, E. base of Pālñis (Fairbank).

The juvenile differs from the adult in being paler and duller throughout and lacking the crest, while the pronounced shaft streaks on the hackled tips to the feathers are wanting. Cap dark sooty brown. Ear-coverts and lower parts—save for the white vent and lower tail-coverts—are warm creamy unicolorous buff. The post-juvénal moult is complete and the first winter bird cannot be distinguished from the adult. There is no spring moult. The complete autumn moult takes place in October and November. The adult female differs from the male merely in having a shorter crest.—H. W.]

The Black-headed Myna is restricted in Travancore and Cochin to the low country under 500 ft. elevation, where it frequents deciduous and secondary scrub jungle about cultivation and human habitations. Flocks of up to 8 or 10 birds were not uncommon, often in association with other Mynas, and they fed extensively on Banyan figs, *Lantana* and *Salvadora persica* berries in the usual mixed company of frugivorous birds.

In the Pālñi Hills Fairbank (*S.F.*, v, 407) obtained specimens at the base and also observed it well up on the hillsides, presumably on the eastern (drier) side.

In Ceylon it is confined to the dry coastal areas.

Breeding: The specimen (9 April) was very fat and its organs showed no departure from the quiescent condition. Ferguson (*J.B.N.H.S.*, xv, 462) does not comment upon the status of this Myna in Travancore. No records of its breeding there or in Cochin exist and it may be that, as in many other parts of its range, it is only a winter visitor to the area.

Acridotheres tristis tristis Linn. The Common Myna.

Specimens collected: 227 ♂ 6-2-33, 277 ♂ 12-2-33 Thattākād 200 ft.; 534 ♂ 8-4-33, 574 ♀, 575 ♂ 12-4-33 Cape Comorin S.L.; 621 ♂ 18-4-33, 633 ♀ 20-4-33 Arāmboli 250 ft.; 711 ♂ 23-7-33 (Beach); 747 ♂ imm. 30-7-33 (Veli, S.L.); 779 ♀ 3-8-33 (Kovālam ca. 70 ft.); 839 ♀ 12-8-33 (Beach) Trivandrum Town and Tālūk; 963 ♂ 9-12-33 Nemmāra 300 ft.

Elsewhere noted at: Marāiyūr (3,000 ft.); Kottāyam (ca. S.L.); Chālakūdi; Wadakkācheri (400 ft.); Trichūr Town; Karūpadanna (ca. S.L.); Ernākūlam.

Colours of bare parts: *Adult*: Iris brown (according to Pillai 'outermost ring greyish-white, succeeded by a ring of fine silver spots surrounding a brownish-red ring which encircles the pupil'); bill yellowish except at sides

of base of lower mandible which are brownish-green; orbital skin bright yellow; mouth dark slate; legs, feet and claws yellow like bill, paler than the bare orbital skin. *Immature*: Iris 'blackish-grey' (Pillai); gape yellow; mouth more pinkish; orbital skin paler; rest as in adult. *Juvenile* ($\frac{3}{4}$ fledged): Iris brown; bill dusky yellowish flesh colour; gape yellowish-cream; mouth bright yellow; legs and feet pale yellowish-flesh; claws dusky.

[Measurements:

| | Bill. | Wing. | Tail. | Tarsus. |
|------|-----------|-----------|-----------|-----------|
| 7 ♂♂ | 25.5-30.5 | 139-150 | 81.5-90.5 | 38-40 mm. |
| 3 ♀♀ | 26-27 | 138-142.5 | 78.5-85.5 | 35-39 mm. |

This good series clearly establishes the fact that Mynas from Travancore are intermediate between *A. t. tristis* and *A. t. melanosternus* and some would be inclined to name them as another of the Travancore races. Compared with birds from N.-W. India they are certainly darker with a more purple tint on the lower plumage, and the white of the ventral patch is somewhat constricted. The upper parts average darker and closely resemble those of *melanosternus*. Below, however, they are not as dark as the latter and they have fewer traces of the extension of the black of the chin, throat and upper breast as a ventral band. I do not think, however, that the naming of this intermediate race would prove of value as the typical race is somewhat variable in colour and size and throughout its range a number of individuals approach these Travancore intermediates in colour. It is better to be content with the statement that while the Myna in India cannot be divided into races—as one might perhaps expect from the robust adaptability of this common bird—the fact may be remembered that it shows a tendency to develop a pale race in the extreme North-West and a saturated race in Travancore.—H. W.]

The Common Myna is an abundant and familiar resident species in the low country of both Travancore and Cochin. Apart from Marāiyūr which is in many respects an exceptional locality with a mixture of hills and plains features, it was not found at all above an elevation of about 400 ft. As elsewhere, it inhabits open country about cultivation and towns and villages.

In the Pālni Hills, Fairbank (*S.P.*, v, 407) found it common about villages at nearly 4,000 ft.

It is a common species in Ceylon.

Breeding: On 4 February (Thattākād) a pair was observed nesting in a hollow about 35 ft. up in a charred tree-trunk standing in a paddy-clearing in deciduous forest. When visited again on 6 February, this tree had been felled. Examination of the nest showed a partially fledged nestling sitting at the entrance, hale and hearty and quite unhurt by the fall! No. 277 (12 February) had testes enlarged to 8×5 mm. On 6 April (Cape Comorin) a nest was located in a hole in a palmyra palm trunk at about 20 ft., while another pair was observed building on 13 April. In specimen No. 534 (8 April) the testes measured ca. 5×4 mm. and appeared to be developing, whereas in other specimens at this time the gonads were as yet in a quiescent state. No. 621 (18 April) had testes measuring 9×5 mm., while 632 (20 April) had one hard shelled egg in its oviduct ready for laying, and the distended nature of this organ indicated that others had already been laid. Among the later specimens Nos. 711 (23 July) with testes measuring 12×6 mm. and 779 (3 August) with the largest ovarian follicle ca. 2 mm. in diameter were obviously breeding. No. 747 (30 July) was immature with imperfectly ossified skull.

Ferguson says (*J.B.N.H.S.*, xv, 462) that the Myna breeds in April in Travancore. The evidence shows that nesting operations commence about mid-January and continue till at least the first week in August and probably later, so that the breeding season in this area is a very protracted one.

Æthiopsar fuscus mahrattensis (Sykes). The Southern Jungle Myna.

Specimen collected: 172 ♂ 28-1-33 Sānthanpāra 3,500 ft.

Elsewhere noted at: Marāiyūr (3,000 ft.—more common and abundant than the foregoing species); Mūnnār (5,000 ft.—Kanan Devan Hills—abundant); Thattākād (200 ft.); Kottāyam (ca. S.L.); Peermade (3,200 ft. fairly

common); Kümili (3,000 ft.—Cardamon Hills—common); Trivandrum Town (ca. S.L.); Wadakkancheri (400 ft.); Karupadanna (ca. S.L.).

Colours of bare parts: Iris bluish-white; bill orange-yellow, dark brown at nostrils; gape and base of lower mandible; mouth dark slate; legs and feet yellow; claws brown.

[The one ♂ measures:

| Bill. | Wing. | Tail. | Tarsus. |
|-------|-------|-------|-----------------|
| 27.5 | 131.5 | 78 | 35.5 mm.—H. W.] |

The statement by Ferguson (*J.B.N.H.S.*, xv, 463) to the effect that this species does not ascend the Travancore hills seems surprising, and it certainly is not correct at the present time. The Survey found it fairly common both in the low and foothills country of Travancore and conspicuously so in the hills where it occurs to the exclusion of the Common Myna. Its distribution, however, is patchy; for example it was absent in the Ashāmbū Hills and my notes do not record it from Rājampāra, Camp Derāmalāi or Pādāgiri.

At Marāiyūr and in the low country, the Jungle Myna was frequently observed in mixed flocks with the Common Myna, grubbing amongst flooded fallow fields or attending on grazing cattle. They fed largely on *Ficus* figs of various species, *Lantana* berries and on the nectar of *Erythrina* (*lithosperma* and other species) blossoms. The specimen, shot off these, had a quantity of pollen adhering to its throat and tuft feathers. The tuft at the base of the culmen acts as an efficient pollen brush.

This Myna has apparently not been recorded from the Pālani Hills and it does not occur in Ceylon.

Breeding: The organs of the specimen (28 January) were in normal non-breeding condition. At Peermade, on 24 February, a pair were observed building in a hollow in a tree-trunk, 8 ft. up, in the compound of the Travellers' Bungalow, and on 4 March several pairs were busy nesting in holes in the partially submerged tree-trunks standing in Periyār Lake.

No published records of its breeding in Travancore or Cochin exist. According to the *Fauna* (iii, 58) the Jungle Myna breeds in South India from February to May and this season evidently applies to our area as well.

FAMILY: PLOCEIDÆ.

Ploceus philippinus travancoreensis subsp. nov. The Travancore Baya or Weaver-Bird.

Specimens collected: 316 ♂, 317 ♂, 318 ♀ 19-2-33 Kottāyam ca. S.L.; 678 ♀ imm. 16-7-33 (Beach); 726 ♂, 727 ♂ 26-7-33, 741 [♂?] 29-7-33 (Kūtāni 300 ft.); 785 ♂ imm. 4-8-33 (Cattle Farm 150 ft.) Trivandrum Tālūk; 913 ♂ imm. 27-11-33 Wadakkancheri 400 ft.

Elsewhere noted at: Marāiyūr (3,000 ft.; only old nest colonies!).

Colours of bare parts: Iris hazel brown; bill horny-brown, yellowish at chin and gape; mouth pink; legs, feet and claws brownish flesh-colour. In the ♀ (318) the brown of the bill is paler.

[Measurements:

| | Bill. | Wing. | Tail. | Tarsus. |
|-------------|-------|-------|---------|-----------|
| 4 ♂♂ adult. | 18-20 | 70-75 | 41.5-48 | 20-21 mm. |
| 2 ♂♂ juv. | — | 68-70 | 40-42.5 | — mm. |
| 1 ♀ | 20 | 72.5 | moult | 19.5 mm. |

These Weavers can certainly not be retained with the typical race. The upper plumage is much darker and browner, while the breast and flanks have a more pronounced brown wash, the shaft streaks being more defined and at the base broader than is usual in the typical race. On these features alone I am prepared to separate this as another of the peculiar Travancore forms and propose for it the name:

PLOCEUS PHILIPPINUS TRAVANCOREENSIS subsp. nov.

Type: No. 317 ♂ (breeding) 19-2-1933 Kottāyam (Backwaters), sea level. Coll.: Sālim Ali. Deposited in British Museum,

There is a further point of interest connected with this series. It contains 4 breeding males—in all of which the organs were enlarged—and none of these have attained the full breeding plumage as known in the typical form. The type has a yellow crown, a fairly developed black throat patch and odd golden feathers on the breast. The other three lack the throat patch and the yellow crown and have the yellow on the breast represented only by odd feathers. One has a yellow wash on the crown, the other two have the supercilium yellow. It is impossible to be dogmatic on so small a series, and the specimens may not be mature, but they suggest that in this race as in *burmanicus*, the normal breeding plumage is largely suppressed. If so, this will be a further character of the race.—H. W.]

Beyond the low country, signs of the Baya were noted only at Marāiyūr (3,000 ft.). Here, two or three small colonies consisting of from 3 to 8 dis-used nests each were observed suspended on mango trees amidst terraced paddy-fields in the valley lying fallow at this season (early January). From the fact that all the nests hung on the eastern side of the trees, it may be presumed that the birds nested here during the south-west monsoon and that they only came up for breeding purposes while the paddy crops were standing and departed after that function had been performed and the paddy harvested.

In the low country of Travancore and Cochin and about the backwaters, where paddy is the principal crop grown, the Baya is common and its works abundantly in evidence in the neighbourhood of this cultivation. In the dry season the birds keep mainly to the backwaters, but spread out during the monsoon over most of the low country.

In the Pālni Hills it of course does not occur, but it is found in suitable localities in Ceylon.

Breeding: Specimen No. 316 (breeding plumage; testes 8×6 mm.), 317 (breeding plumage; testes 9×5 mm.) and 318 (ovarian follicles over 1 mm. in diameter) were all shot on 19 February off a colony of about 25 nests in various stages—some completed and occupied by females, others barely begun. They hung from the fronds of a coconut palm (ca. 50 ft. up) in a hamlet on the banks of Vembanād backwaters. The breeding season of the Baya in this area, as elsewhere, seems to be directly correlated with paddy cultivation which provides the birds with both nesting material and food for themselves and their young. In localities where paddy cultivation is dependent wholly upon the rainy season, it is well known that nesting operations do not commence until after the monsoon has well set in and the paddy plants or the coarse saw-edged grasses which supply the building material are several inches high. In the backwaters where irrigation is perennial, paddy crops were standing at this period (middle February) ready to be harvested in about a fortnight. As soon as this crop is reaped a second sowing is made which ripens before the south-west monsoon sets in. During the monsoon months all the paddy land in the region of the backwaters is completely submerged so that Bayas can only continue to breed in this neighbourhood from early in the year up till the commencement of the south-west monsoon in May or June, or more precisely between the end of one monsoon and the beginning of the next. During the rainy season therefore the Bayas resort to the neighbourhood of the regular paddy cultivation further inland, and this is presumably the explanation for the deserted nest colony in January at Marāiyūr. Two of the July specimens (726 and 727) had enlarged organs and were ready to breed, and Pillai notes that on 4 August nesting activities were still in full swing near the Cattle Farm. Two of the July/August specimens are immature with yellow gapes and imperfectly ossified skulls.

It is evident that on account of the favourable conditions obtaining in Travancore as regards paddy cultivation, Bayas breed here practically throughout the year, most probably in shifts or relays as they become sexually mature.¹

¹ At my request Mr. Pillai visited the Kottayam backwaters in the middle of December (1935) in search of further breeding specimens. He found that paddy cultivation there had only just commenced and he failed altogether to come across any Bayas at that time.

According to *Nidification* (iii, 3) Bourdillon took many nests with eggs in Travancore in May and thence onwards to August.

In our experience, paddy leaf is the building material exclusively, or at least most extensively, used in Travancore and Cochin. We did not see any nests made of cocoanut fibre, as have been described, in spite of the great abundance and availability of this material. The birds are capricious in regard to the selection of sites. Cocoanut palms are largely patronised, but sometimes a couple of palmyra palms standing amidst a cocoanut grove or in its vicinity seemed to be the centre of attraction, all the nests being concentrated upon them.

Ploceus manyar flaviceps Lesson. The Madras Streaked Weaver Bird.

Specimen collected: 288 ♂ 15-2-33 Vembanād backwaters, Kottāyam.

Elsewhere not noted.

Colours of bare parts: Iris brown; bill brownish-horn, paler at commissure; legs and feet brownish-pink; claws dusky.

[Other Travancore specimens seen:

Brit. Mus. Coll.: ♂ and juv. 21-6-77 Vellarney Lake (Hume Coll.).

The Survey specimen—♂ in breeding plumage—measures:

| Bill. | Wing. | Tail. |
|-------|-------|---------------|
| 18.5 | 71 | 45 mm.—H. W.] |

Ferguson (*J.B.N.H.S.*, xv, 468) describes this Weaver as confined to the plains in Travancore, where it is not common. The Survey only came across it by the Vembanād backwaters near Kottāyam where the birds were breeding and fairly numerous, though only in patches.

It is a local resident in Ceylon.

Breeding: The specimen (15 February—breeding plumage) had enlarged testes measuring 7×5 mm. and it was busy collecting strips of the coarse saw-edged grass that grows so plentifully on bunds and dykes along the backwaters. A colony of 15 nests was located on the same date among tufts of tall grass and *Pandanus* thickets growing on a small islet in the back of water, barely three yards by two. The nests were smaller than those of *Ploceus philippinus*, woven more loosely and roughly, and in texture rather resembling those of the Indian Wren-Warbler. They lacked the prolonged entrance tubes and had only slight 'porches'. Pellets of mud were plastered within as is the case with the Common Baya. The colony contained several unfinished nests in various stages, and among the birds a preponderance of males in breeding dress over females was noticed. Of the completed nests examined, one contained 3 eggs, 3 nests 2 eggs each, and 1 contained a single. Two eggs taken, measured 19×13.5 and 19×14 mm. respectively.

T. F. Bourdillon (*S.F.*, vii, 39) found thousands beginning to build in June amongst the reeds which formed floating islands in the Vellayāni Lake about 6 miles from Trivandrum. *Nidification* (iii, 9) adds that the same observer found it breeding in Travancore from July to September. These reed beds have since disappeared and with them the nesting colonies of the Streaked Weaver-bird.

I should not be surprised if, like the Common Baya, this species is also found to breed in the Travancore-Cochin area over a considerable part of the year, varying with local conditions. In Northern India birds in February and March are in eclipse plumage and breed about September. Wait (*Birds of Ceylon*, p. 115) says that the breeding season on the island is in February and March and again in June.

Munia malacca (Linn.). The Black-headed Munia.

Specimens collected: 257 ♀, 258 ♂, 259 ♂ 10-2-33 Thatiākād 200 ft.

Elsewhere not noted.

Colours of bare parts: Iris brown; bill pale bluish-grey, dusky on culmen; mouth cream colour with slaty crescent and blotches; legs and feet slate; claws horny-brown.

[Other specimens examined:

Brit. Mus. Coll.: ♂ 21-6-77 Vellarney Lake (Hume Coll.).

B.N.H.S. Coll.: ♂, ♀ 20-7-93 Kodaikanal (Pälñis); ♂ 31-1-01 Devicolam [Travancore] (Ferguson).

Measurements:

| | Bill. | Wing. | Tail. | Tarsus. |
|------|---------|---------|---------|--------------------|
| 2 ♂♂ | 13-13.5 | 55.5-56 | 32 | 16 mm. |
| 3 ♀♀ | 13-13.5 | 53-55.5 | 30.5-35 | 16-16.5 mm.—H. W.] |

The Travancore Survey only once came across a single flock of 20 to 25 birds in the vicinity of standing irrigated paddy crops in a clearing in deciduous jungle. All the 3 specimens secured were undergoing complete moult.

According to Ferguson (*J.B.N.H.S.*, xv, 468) it is only found in the low country of Travancore where flocks may often be met with especially about the backwaters. Stewart apparently found them in the hills also, to what elevation is not stated.

In the Pälñi Hills, Terry (*S.F.*, x, 478) found it fairly common in the Lower Pälñis and breeding in the Pittur Valley in April. There is a specimen from Kodaikanal in the Bombay Natural History Society's Collection.

The Black-headed Munia is a locally distributed resident in Ceylon.

Breeding: The Survey procured no data on the nesting of this species in Travancore or Cochin. Bourdillon (*S.F.*, vii, 39) found it breeding among the reeds in Vellayāni Lake (near Trivandrum) in June. Stewart also obtained nests in grass fields in Travancore (*Nidification*, iii, 14) but the season is not mentioned; Ferguson gives the breeding season here as May to August.

Uroloncha striata striata (Linn.). The White-backed Munia.

Specimens collected: 314 ♂, 315 ♀ 19-2-33 Kottāyam ca. S.L.: 418 ♂, 419 ♀ 7-3-33 Kūmili 3,000 ft.

Elsewhere noted at: Thattākād (200 ft.); Nemmāra (300 ft.); Karūpādanna (S.L.).

Colours of bare parts: Iris brown; bill, upper mandible horny-black, lower bluish-grey; mouth pinkish-grey or pale yellow and grey; legs, feet and claws slate or slaty-brown.

[No other Travancore specimens seen.]

Measurements:

| | Bill. | Wing. | Tail. | Tarsus. |
|------|---------|-------|---------|---------------|
| 2 ♂♂ | 13-13.5 | 51-54 | 38 | 13.5 mm. |
| 2 ♀♀ | 13.5 | 53-54 | 38.5-39 | 13 mm.—H. W.] |

The White-backed Munia is, as Ferguson observes, commoner in Travancore—also in Cochin—than the foregoing species, though far from generally distributed. The Surveys came across it in the low country as well as, to a lesser extent, in the hills up to 3,000 ft. elevation. Flocks of 8 to 15 birds and smaller parties were usually observed about paddy cultivation in forest clearings, in fruit gardens by homesteads along the backwaters, and also in lightly wooded cultivated country generally.

In the Pälñi Hills, Terry (*S.F.*, x, 478) found a flock in the Pittur Valley, but says nothing about its status. It is a common species in Ceylon up to 2,500 ft. and in parts up to 4,000 ft.

Breeding: Specimens Nos. 314 and 315 (19 February) were a pair building in a pollarded *Thespesia populnea* tree, about 7 ft. up, near a backwater homestead. The testes of the former measured 5×4 mm., while the largest ovarian follicle of the latter was about 4 mm. in diameter. The gonads of the other 2 specimens were in a quiescent state.

In Travancore Stewart and Bourdillon obtained eggs from May to August, but both say that odd nests with young or eggs may be found in any month. . . . Bourdillon speaks of clutches of 8 eggs. (*Nidification*, iii, 18).

Uroloncha kelaarti jerdoni (Hume). The Rufous-bellied Munia.

Specimens collected: 187 ♀ imm., 188 ♀ 30-1-33 Sānthanpāra 3,500 ft.: 250 ♀ 9-2-33 Thattākād 200 ft.; 671 ♂ 26-4-33 Balamore Estate 2,000 ft.

Elsewhere noted at: Marāiyūr (3,000 ft.); Wadakkācheri (400 ft.); Pādāgiri (3,000 ft.—Nelliampathy Hills).

Colours of bare parts: Iris brown; bill dark horny-brown, bluish at chin and base of lower mandible; mouth slate with pale yellow crescent on palate and patches of the same colour; legs and feet greenish-plumbeous; claws horny-brown. The immature (No. 187) differed from the adults in having the mouth cream colour, blotched with slaty and in having no greenish tinge on the legs and feet.

[A small series from Travancore (Fry and Bourdillon) in the British Museum examined, but I have omitted to note details of individuals.

Measurements:

| | Bill. | Wing. | Tail. | Tarsus. |
|-------|---------|-------|---------|------------------|
| 1 ♂ | 14 | 56.5 | 43 | 13.5 mm. |
| 3 ♀ ♀ | 13-13.5 | 57-58 | 36.5-38 | 14-15 mm.—H. W.] |

This is a fairly common resident species in Travancore and Cochin, more or less confined to the hilly portions though also met with by the Surveys sparingly in the foothills country, but not at all in the succeeding plains belt or on the coast. It frequented scrub and grassland sometimes in the proximity of cooly-lines or hillmen's settlements on the edge of jungle and tea plantations, in small parties of 3 or 4 or flocks of up to 30 or more birds.

It is apparently common in the Palni Hills. In Ceylon, the typical race *U. k. kelaarti* (Jerdon) is found in the hills above 2,000 ft.

Breeding: No. 187 (30 January) was immature with very imperfectly ossified skull and in worn juvenile plumage. No. 671 (26 April) had testes measuring 4x3 mm. and it was undergoing pre-nuptial moult. No other data in this regard was procured by the Surveys.

T. F. Bourdillon (*J.B.N.H.S.*, xv, 468) gives the breeding season in Travancore as June to August and says that the birds nest at elevations of 2,000 ft. and upwards. Six to eight eggs is said to be the normal clutch.

Uroloncha malabarica (Linn.). The White-throated Munia.

Specimens collected: 559 ♂ 10-4-33 Cape Comorin ca. S.L.; 631 ♀ 20-4-33 Arāmboli 250 ft.

Elsewhere not noted.

Colours of bare parts: Iris brown; upper mandible horny-brown, lower bluish-grey; mouth grey and pink; legs, feet and claws greyish-pink.

[Plumage too worn for measurements. No other Travancore specimens seen.—H. W.]

I can fully endorse Ferguson's statement (*J.B.N.H.S.*, xv, 469) that in Travancore this Munia is only found in the dry open country about Cape Comorin—up to approximately the Arāmboli Gap—where it is fairly common, being also the only Munia met with. It was observed in pairs, family parties or small flocks feeding on grass-seeds, etc.

In Ceylon also the distribution of this species is restricted to the dry areas in the north.

Breeding: Both the specimens (10 and 20 April) had slightly enlarged gonads. The male was in heavy general moult and the female in very worn plumage. On 19 April a bird was observed carrying building material—a grass blade—in its bill, so evidently some nesting at any rate was in progress then.

Ferguson gives the breeding season as December to March.

Uroloncha punctulata lineoventer (Hodgson). The Spotted Munia.

Specimens collected: 728 ♂ 26-7-33 (Küttāni 300 ft.); 765 ♂ 1-8-33 (Beach) Trivandrum Taluk and Town; 934 ♂ 3-12-33, 943 ♂ 5-12-33, 966 ♂ 10-12-33 Nemmāra 300 ft.; 1045 ♂ 30-12-33 Karūpadanna ca. S.L.

Elsewhere not noted.

Colours of bare parts: Iris orange-brown; bill slaty-black, blue-grey at base of lower mandible; mouth slaty-grey with cream-coloured crescent on palate; legs and feet bluish-slate; claws brown.

[Measurements:

| | Bill. | Wing. | Tail. |
|-------------------------|---------|---------|-----------|
| 5 ♂♂ (breeding plumage) | 12-13.5 | 57-58.5 | 37-41 mm. |
| 1 ♂ (brown plumage) | 12.5 | 54 | 33 mm. |

Additional specimens examined:

Brit. Mus. Coll.: ♀ 17-6-77, ♀ 12-6-77 Lower Pálnis (Fairbank).

I have not yet been able to work out—for lack of the necessary moulting specimens—the relationship between the brown and spangled plumages.—H. W.]

The Surveys found the Spotted Munia much more generally distributed in the low country in Cochin than in Travancore, nowhere above 300 ft. elevation, and as Ferguson says (*J.B.N.H.S.*, xv, 469) it evidently does not ascend the hills in this area. This is curious because in the Nilgiris I found several nests at Kotágiri (ca. 6,300 ft.) in July and August, and a pair were building in the Ootacamund Botanical Gardens (ca. 7,000 ft.) on 27 September.

The birds were met with in pairs, small parties and flocks—one of over 70—in the neighbourhood of paddy cultivation in hummocky country. It was observed that the flocks in December comprised chiefly of birds in the plain brown plumage. Its food seemed to consist very largely of ripening paddy grains supplemented by grass-seeds. The crops and stomachs of the specimens were gorged with the grains. The crop of one contained 14 entire grains of green paddy, while its stomach was packed with broken pieces of the same.

Fairbank met with this species twice in the Lower Pálnis, but unfortunately does not comment upon its status there. In Ceylon it is generally distributed up to 2,500 ft. and locally to 4,000 ft.

Breeding: The July and August specimens both had testes enlarged to 6×4 mm. They were in fresh spotted plumage and evidently breeding. Of the four December specimens, Nos. 434 (3 December—testes 4×3 mm.—incubation patch!) had probably lately finished breeding. No. 943 (5 December—testes 6×4 mm.) a partial albino, was in very worn dress and moulting primaries, secondaries and rectrices. It had either just finished breeding or was changing into pre-nuptial dress. No. 966 (10 December) in plain brown plumage had undeveloped organs. Unfortunately its skull was damaged by shot which rendered age determination impossible. No. 1045 (30 December—testes 5×4 mm.—spotted plumage) was apparently breeding.

According to Ferguson, this Munia breeds in Travancore from April to July. From the evidence provided by the Survey specimens and the data collected in the field, it seems more likely that breeding continues irregularly, more or less throughout the year.

Amandava amandava amandava Linn. The Red Munia.

This Munia has not been recorded in Travancore or Cochin, but Terry found a large flock at Pulangi in the Pálnis Hills in April (*S.F.*, x, 478).

FAMILY: FRINGILLIDÆ.

Carpodacus erythrinus roseatus (Blyth). The Common Indian or Hodgson's Rose-Finch.

Specimens collected: 24 ♂ 6-1-33 Maráiyûr 3,000 ft.; 105 ♂ 18-1-33 Münnâr 5,000 ft.; 993 ♀ 18-12-33 Pädagiri 3,000 ft.

Elsewhere noted at: Sänthanpára (3,500 ft.—Cardamom Hills).

Colours of bare parts: Iris brown; bill, legs, feet and claws horny-brown.

[Measurements:

| | Bill. | Wing. | Tail. | Tarsus. |
|----------|-------|---------|-------|-------------|
| 2 ad. ♂♂ | 14.5 | 85.5-87 | 55-59 | 17.5-19 mm. |
| 1 ♀ | 15 | 84.5 | — | 18.5 mm. |

No other specimens from Travancore seen.

The juvenile closely resembles the adult female. I have not seen the post-juvénal moult, but young birds in their first winter and summer still resemble the adult female and cannot be distinguished in any way from her.

Many males breed in this plumage but I have seen no evidence to show whether it is moulted at the second autumn between August and October or whether it is retained and adult males must be considered dimorphic.

Adults have a complete post-nuptial moult from August to October. There is no pre-nuptial moult and the plumage in consequence becomes considerably worn in summer. The female then becomes much duller and browner. The male changes considerably in appearance as a result of the wearing off of the feather edges and an apparent increase of colour owing to the prismatic effect of transmitted light on the worn surface.¹—H. W.]

The Rose-Finch is a common winter visitor to the northern hill ranges of Travancore. Kinloch records it as fairly common in the Nelliampathy Hills (Cochin) and Ferguson found it in the High Range. The southernmost point at which the Surveys came across it was in the Cardamom Hills at ca. 10°N. lat. It goes about in small flocks of usually up to about 20 birds, frequenting scrub country on the outskirts of evergreen sholas and hillmen's settlements, and cardamom, tea and coffee plantations. The highest elevation at which the Surveys came across them was about 7,000 ft. (above Marāiyūr) in *Rubus* thickets bordering hill streams.

Their food was observed to consist largely of the berries of *Lantana camara*, *Maesa perrottetiana* and *Trema orientalis*—also seeds and flower buds of *Polygonum chinense* L.—while they regularly visited *Erythrina lithosperma* shade trees in coffee plantations for the nectar of their blossoms. The chin of a specimen shot off these was coated with pollen.

The Rose-Finch has apparently not been recorded in the Pālni Hills nor has it yet occurred in Ceylon.

Gymnorhis xanthocollis xanthocollis (Burton). The Yellow-throated Sparrow.

Specimens collected: 507 ♂ 4-4-33 Trivandrum Town; 560 ♂ 10-4-33 Cape Comorin; 897 ♂ 24-11-33 Wadakkācheri 400 ft.

Elsewhere noted at: Marāiyūr (3,000 ft.); Thattākād (200 ft.); Kottāyam (ca. S.L.); Vadāserikara (ca. 400 ft.—near Rājampāra); Arāmboli (250 ft.); Nemmāra (300 ft.); Karūpadanna (ca. S.L.).

Colours of bare parts: Iris brown; bill brownish-black; mouth greyish-pink; legs, feet and claws brownish flesh colour.

[Measurements:

| | Bill. | Wing. | Tail. | Tarsus. |
|------|-------|-------|-------|-------------|
| 3 ♂♂ | 15-17 | 83-86 | 50-53 | 16-17.5 mm. |

Other specimens examined:

Trivandrum Mus.: ♀ 7-7-07 Arāmboli.

Also 4 Fry and Anjango birds in the British Museum without data.

The post-nuptial moult in this species is complete, and there is no pre-nuptial moult. The post-juvinal moult is said by Ticehurst to be complete.—H. W.]

The Yellow-throated Sparrow is fairly common in the drier portions of the low country of both Travancore and Cochin where it frequents the neighbourhood of cultivation and backwater homesteads, and also light deciduous jungle. In the cold weather they were observed keeping in flocks, often of considerable size, gleaning paddy grains in harvested fields and feeding extensively on *Lantana* berries and on the nectar of *Bombax* and *Erythrina* flowers in mixed avian company. At this season, large numbers usually congregated into leafy bamboo clumps or bushy trees during the heat of the day and created a great noise with their chirping. Except at Marāiyūr, it

¹ Two males, apparently of this race, in the aviary of Sahebzada Dr. Saidzafar Khan (Dehra Dun) moulted at the end of October from the adult rose-coloured plumage into one closely resembling the female but with the chin, cheeks and throat a more or less immaculate vinous-buff. At the time of writing (6 December) this plumage remains unchanged although in the wild state males (at least some) may still be seen in the rose-coloured plumage. I do not find this eclipse plumage of the male recorded in the literature.—S. A.

was not met with above about 500 ft. elevation. Already by the first week of February, the flocks had started breaking up, and by the beginning of April, pairs had become the rule and courtship was in progress generally.

It does not ascend the Pālñi Hills, but Fairbank (*S.F.*, v, 408) found it plentiful at Periakulam near their eastern (dry) base. In Ceylon it is only a straggler.

Breeding: No. 560 (10 April) had testes measuring 7×5 mm. and it was breeding. On 12 April a pair were observed feeding young in a hollow 7 ft. up a *Thespesia* trunk (Cape Comorin) and on 13 April another nest was in occupation.

Ferguson (*J.B.N.H.S.*, xv, 469) states that in Travancore this species breeds in May and June.

***Passer domesticus indicus* Jardine & Selby. The Indian House-Sparrow.**

Specimens collected: 53 ♂, 54 ♀ 10-1-33 Marāiyūr 3,500 ft.; 518 ♂, 519 ♂, 520 ♀ 7-4-33, 586 ♂ 13-4-33 Cape Comorin ca. S.L.; 629 ♂ 19-4-33 Arāmboli 250 ft.; 678 ♀ 16-7-33, 714 ♂ 23-7-33, 764 ♀, 767 ♂ 1-8-33 Beach, Trivandrum.

Elsewhere noted at: Wadakkācheri (400 ft.); Nemmāra (300 ft.); Trichūr; Karūpadanna (S.L.); Ernākūlam; Cochīn Town.

Noted as absent (or exceedingly rare ?) at: Mūnnār (5,000 ft.); Kottāyan (ca. S.L.); Peernade (3,200 ft.); Kūmili (3,000 ft.—none observed, but said to occupy dwellings in town sparingly); Tenmalāi (500 ft.).

Colours of bare parts: Iris brown; bill in ♂ dark horny-brown to black, in ♀ and immature pale horny-brown; mouth yellowish-pink, pink, or slaty-pink varying with age; legs and feet brownish flesh colour; claws dusker.

[Measurements:

| | Bill. | Wing. | Tail. | Tarsus. |
|-------|---------|---------|---------|---------------|
| 10 ♂♂ | 13-14.5 | 72-78 | 49-55.5 | 16-18 mm. |
| 4 ♀♀ | 13.5-15 | 70.5-74 | 51-55 | 17.5-18.5 mm. |

In the Eastern Ghats Survey (*J.B.N.H.S.*, xxxvi, 838) I commented on the fact that the available series of House-Sparrows from Southern India was a poor one but that as far as it went it allowed me to state that no difference either in size or colour could be distinguished between South Indian birds and birds from Northern India, south of the Himalayas. The good series obtained by the Surveys has now confirmed that view. The Travancore birds agree in colour, state for state, with my Punjab series and there is no appreciable difference in measurements:—

| | Bill. | Wing. | Tail. | Tarsus. |
|-------------|---------|-----------|---------|-----------|
| 8 ♂♂ Punjab | 13.5-14 | 72.5-78 | 51.5-57 | 17-18 mm. |
| 4 ♀♀ Punjab | 14-15.5 | 72.5-77.5 | 53-54.5 | 17-20 mm. |

In the Sparrow the post-juvénal moult is complete. There is no spring moult and the autumn moult is complete. The juvenile plumage is too well known to require description.—H. W.]

The distribution of the House-Sparrow in this area is curious. It is fairly general in the low country of Cochīn, but becomes inexplicably patchy and espricious in North Travancore as will be seen from the gaps indicated above. In the low and coastal country of South Travancore it is common. Excepting at Marāiyūr—and possibly at Kūmili—both along the highways of communication between Travancore and the adjoining drier districts of Madras Presidency through the barrier of the ghats that separate them, it was not met with above an elevation of about 500 ft. Wherever present it was, of course, as a commensal of man.

In the Pālñi Hills, Fairbank (*S.F.*, v, 408) found House-Sparrows in villages up to 5,000 ft. altitude. The same race, *indicus*, is abundantly resident in Ceylon.

Breeding: In the first week of January (1933) House-Sparrows were observed breeding commonly among the rafters and thatching of the huts in Marāiyūr village. The organs of Nos. 53 and 54 (10 January) confirmed this: the testes of the former measured 5×4 mm., while the ovarian follicles and distended oviduct of the latter indicated that it had lately finished laying.

Of the April specimens, only 586 (13 April) with testes enlarged to 7×5 mm. was breeding, while in 519 (7 April) the testes were slightly developed (3×2 mm.) although its imperfectly ossified skull showed that the bird was as yet immature. In the second week of April, however, Sparrows were nesting freely in holes in the masonry sides of the Travellers' Bungalow well at Cape Comorin. This was also observed to be the case in the frontier Customs station at Arāmboli on 14 April.

The gonads of three of the July/August specimens indicated that breeding was still in progress at that time. In No. 714 (23 July) the testes measured 9×4 mm. while the largest ovarian follicle of 764 (1 August) was about 3 mm. in diameter.

On 3 January (1934) nesting was in progress on cornices etc. in the Guest House at Ernākūlam, and on the same date similar activity was noted in and about the historic synagogue of the White Jews in Cochin Town.

Ferguson says (*J.B.N.H.S.*, xv, 469) that the Sparrow breeds in Travancore in February and March, but the evidence shows that there is no definite season and that it does so more or less throughout the year.

FAMILY: HIRUNDINIDÆ.

Delichon urbica (Linnaeus). The House-Martin.

Not met with by the Surveys, neither recorded from this area by previous observers, but there is a specimen labelled 'Travancore' from Surgeon-General Fry in the British Museum with no more precise date. It is open to doubt whether this specimen was actually procured in Travancore or purchased from some dealer there, or perhaps even mislabelled.]

Riparia concolor (Sykes). The Dusky Crag Martin.

Specimens collected: 597 ♂ 15-4-33, 620 ♂ 18-4-33 Arāmboli 250 ft.: 886 ♂ 20-11-33 Kūriārkkūtti 1,600 ft.

Elsewhere noted at: Pādāgiri (at ca. 3,000 ft.—Nelliampathy Hills).

Colours of bare parts: Iris brown; bill blackish-brown; mouth pale flesh colour; legs and feet pinkish-brown; claws horny brown.

[Measurements:

| | Bill. | Wing. | Tail. |
|-------|-------|-------------|-----------|
| 3 ♂ ♂ | 10-11 | 109.5-112.5 | 45-46 mm. |

This is an extension of range as the Dusky Crag Martin was not previously known to occur south of the Nilgiris where according to William Davison it is found at all elevations as a not uncommon winter visitor, a few birds staying to breed.—H. W.]

The Dusky Crag Martin has not been recorded from the Travancore-Cochin area before. It was found to be very locally and patchily distributed in the low country as well as hills, and far from common. The birds were usually observed hawking insects in company with Common or Spine-tail Swifts over steep grass-covered hillsides with sheet rock or cliffs and scarps, up to about 5,000 ft. elevation.

The species has not occurred in the Pālani Hills and it does not extend to Ceylon.

Breeding: The testes of specimen No. 597 (15 April) measured about 3×2 mm., those of the other two (20 November and 18 April) being in a quiescent state. Both the April birds were undergoing complete post-nuptial moult. No. 620 (18 April) was one of a pair which had a nest on an inaccessible ledge of rock, ca. 40 ft. up, in the hills bordering the Arāmboli Gap. The contents of the nest could not be ascertained, but from the fact that the owners visited it every now and again, and their actions while there, I presume that it contained fairly grown young which the parents were feeding.

Elsewhere in its range, the Crag Martin breeds largely in February and March.

Hirundo rustica gutturalis Scopoli. The Eastern Swallow.

Specimens collected: 289 o? 15-2-33, 299 ♂ 17-2-33, 305 ♂ juv. 18-2-33 Kottāyam (Vembanād Backwaters); 529 ♂, 530 ♂ 7-4-33, 578 ♂ 12-4-33 Cape Comorin; 1012 o? juv. 25-12-33 Karūpadanna ca. S.L.

Elsewhere not noted.

Colours of bare parts: Iris brown; bill, legs, feet and claws blackish-brown; mouth pinkish-yellow. In juvenile (No. 305) bright yellow.

[Additional specimen seen:

Brit. Mus. Coll.: ♀ 28-2-80 Quilon [Travancore] (Bourdillon).

In the Swallow, both in the typical race and in *H. r. gutturalis*, to which I attribute these specimens from their small size and broken breast band, both the post-juvénal moult and the post-nuptial moult of the adult are complete and appear to take place somewhat irregularly and slowly, occupying the greater part of the winter. There is no time for a spring moult as some of these specimens have still not completed their moult by April.

These specimens (adults and juveniles) are all, except No. 289 which has finished, in different stages of their moult and so cannot be measured.—H. W.]

The Surveys found this Swallow fairly common in the neighbourhood of paddy cultivation in the low country, especially the coastal region and about the backwaters, both in Travancore and Cochin. Ferguson (*J.B.N.H.S.*, xv, 470) describes it as a winter visitor to the low country in Travancore (and not hill country as is inadvertently stated in the Eastern Ghats Report, *J.B.N.H.S.*, xxxvi, 840). The birds were most abundant about the backwater paddy-fields where they were to be seen either perched on the tall grass stems or dyke stakes, or hawking insects over the standing crops or the surface of the water.

This species is a winter visitor to Ceylon.

The gonads of the specimens were in a quiescent state. No. 529 (7 April) was very fat suggesting that it was more or less ready to emigrate.

Hirundo javanica domicola Jerdon. The Nilgiri House-Swallow.

Specimens collected: 38 ♀, 39 ♂, 40 ♀ 9-1-33 Marāiyūr 3,500 ft.; 663 ♂, 664 o? juv., 665 ♂, 666 ♂ juv. 25-4-33 Marūthānkūzhi 4,000 ft. (Ashāmbū Hills); 1001 o?, 1002 o? 20-12-33 Pādāgiri 3,000 ft.

Elsewhere not noted.

Colours of bare parts: *Adult*: Iris brown; bill brownish-black; mouth yellowish-pink; legs and feet horny-brown; claws like bill. *Immature*: Iris brown; bill horny-brown, yellow at gape; mouth and gape yellow; legs and feet pinkish-brown; claws horny-brown.

[Measurements:

| | Bill. | Wing. | Tail. |
|----------|---------|-----------|-------------|
| 2 ♂♂ ad. | 10.5-11 | 103-104.5 | 46.5-47 mm. |
| 2 ♀♀ ad. | 10.5 | 103.5 | 44.5-45 mm. |
| 3 juvs. | — | 100-101.5 | 42-42.5 mm. |

The juvenile is very similar to the adult but the upper parts are less metallic, the chestnut forehead is less defined and the chestnut of the chin, throat and breast is softer and paler. The rest of the lower parts are faintly washed with pinkish-white. The tertiaries and their coverts and the lower tail coverts are broadly edged at their tips with pinkish white. The outer tail feathers are blunter at the tip.

This good series confirms the distinctness of the South Indian race which differs from the typical race in the smaller bill and the greener gloss of the upper plumage.—H. W.]

The lowest elevation at which the Surveys came across the Nilgiri House-Swallow was about 3,000 ft. (Marāiyūr), and as Ferguson says (*J.B.N.H.S.*, xv, 470) it is usually found at 4,000 ft. and upwards in the hills of both Travancore and Cochin. Kinloch (*J.B.N.H.S.*, xxix, 564-5) records it from the Lily Downs of Cochin, ca. 4,700 ft. The birds were met with in fair numbers hawking insects over grassy hillsides and on the edge of tea plantations. No. 666—a juvenile—was observed being fed by its parent in mid-air.

This swallow probably occurs in the Pālmi Hills, but there are no records thence. It is a resident in the Ceylon hills.

Breeding: The gonads of the specimens furnished no indication as regards breeding, but skull examination and colours of bare parts showed that two of the birds procured on 25 April were juvenile and evidently lately out of nest.

According to Bourdillon (*J.B.N.H.S.*, xv, 470) the breeding season in Travancore is March, April and May. It builds its mud nest, well lined with feathers, usually singly and not in colonies, under the eaves of a house or even against a rock. 1 to 3 eggs is said to be the normal clutch.

***Hirundo daurica erythrogygia* Sykes. Sykes' Striated Swallow.**

Specimens collected: 92 ♀ 14-1-33 Marāyūr 3,000 ft.; 279 ♀, 280 ♀ 12-2-33 Thattākād 200 ft.; 638 ♀ 21-4-33 Arāmboli 250 ft.

Elsewhere noted at: Kottāyam (S.L.); Camp Derāmalāi (3,000 ft.—Panthalam Hills); Wadakkācheri (400 ft.); Karūpadanna (ca. S.L.).

Colours of bare parts: Iris brown; bill, legs, feet and claws dark horny-brown (in No. 92 with a pinkish tinge); mouth pinkish-yellow.

[Measurements:

| | Bill. | Wing. | Central tail feathers | Outer tail feathers |
|------|-------|-----------|-----------------------|---------------------|
| 4 ♀♀ | 10-11 | 110-116.5 | 40-43.5 | 71-79 mm. |

These 4 specimens have the chestnut rump-band slightly richer in colour than is usual, but I am not satisfied that this difference is of subspecific value. It is very slight in degree and the colour of the rump-band is apt to vary with wear and bleaching.

No other Travancore specimens seen except one in the British Museum without data from Surgeon-General Fry.—H. W.]

Sykes's Striated Swallow is fairly common in the low country of Travancore and Cochin and was also met with by the Surveys sparingly and capriciously in the hills up to about 3,500 ft. Ferguson (*J.B.N.H.S.*, xv, 470) shot a specimen in the High Range at over 5,000 ft. and Kinloch (*ibid.*, xxix, 564-5) records it (*nepalensis*) on the Lily Downs of Cochin at about the same elevation.

In the Pāni Hills, Terry (*S.F.*, x, 469) saw this species at Pulungi in April. It is a rare straggler to Ceylon where the chestnut tinted *H. d. hyperythra* Layard is the resident form.

Breeding: Nos. 279 and 280 (12 February) had conspicuously granular ovaries which, with their more or less immaculate plumage, suggested that they were ready to breed shortly. No published record of its breeding in Travancore or Cochin exists, however, and the *Fauna* (iii, 251) even describes this bird only as a winter wanderer into our area.

***Hirundo daurica* subsp.?**

Specimens collected: 1021 ♀, 1022 ♂?, 1023 ♂? imm., 1024 ♂ 27-12-33 Karūpadanna ca. S.L.

Elsewhere ?

Colours of bare parts as in the foregoing.

[These 4 swallows are all immature and by their measurements (wing: 114.5-117.5, central tail feathers: 37.5-43, outer tail feathers: 76.5-90 mm.) are evidently not *erythrogygia*, for it will be remembered that the tail in the juvenile is always shorter than it will be in the adult. Correctly sexed young birds from the breeding ground of the various races are too rare in collections for me to have worked out the differences between the immature birds of different races, but these agree with other young birds found in India in winter which I have hitherto (provisionally) called *nepalensis*.—H. W.]

These swallows were shot out of a vast concourse of several hundred (or thousand ?) birds that collected morning after morning on some telegraph wires near the Travellers' Bungalow. They began assembling at about 7 o'clock and flew about in dense shoals or sat huddled together for over two furlongs of the line, all facing the sun and preening themselves. By about 9 or 9-30 they had usually all dispersed to feed. None were to be seen on the wires in the evenings and it was observed that the birds all retired to roost for the night among the reeds on small islets in the backwaters, which were white with their droppings.

(To be continued).

HOG-HUNTING REMINISCENCES.

BY

J. C. A.

During the half century of the life of the Bombay Natural History Society no articles on pig-sticking—that is more realistic than hog-hunting! have appeared in the *Journal*; so these reminiscences, dating back to 1889, may be of interest to readers, especially those new to the country.

Forty-six years is a long time to look back; yet do I most vividly recollect that tense moment when I first viewed 'the great grey boar'. 'There was something close to the water's edge, and my heart with one leap stood still,'—What a pity it is there was no poet in those days of the like of Lindsay Gordon to record in splendid verse the joys of the King of all Sports; though this is said in no carping spirit against the great epic song of the Hog-hunter, which will aptly find a place in these pages before we lay aside our phantom spear.

That first encounter with the redoubtable foe was soon after I entered upon the glorious life of an Indigo Planter in Tirhoot, that level, cultivated, country which lies between the mighty Ganges and its great tributary the Gandak river bringing icy floods from the snowy ranges of Nepal.

My Factory Manager was a splendid horseman and a noted G.R., for despite his inches—he was over six feet, he was thin as a lath so rode about 9 stone 10 pounds. Rightly could it be said of 'Bob' Crowdy—he raced under the name of 'Mr. Bob':—

'A rider unequalled, a sportsman complete,
A rum one to follow, a bad one to beat.'

Many are the tales which could be told of his reckless ways of putting even his racehorses and chasers into a trap without previous training; and as often as not he would scorn the high road and take short cuts across country to the terror of any less venturesome companion who might be with him. A dangerous man indeed to be alongside of! A counterpart he was of the famous John Mytton.

With such a chief, it was not long before I possessed a modest stable and entered into the varied sports of those days. It was on a pretty warm morning in the early part of May that six of us were out in pursuit of pig. We were beating some 'ijer' jungle, consisting of fair-sized trees which favour low-lying, swampy, ground. E and I were together, as we separated ourselves into three heats. Some time after the beat started a fine old grey boar broke on our side, and giving the usual 'law' we raced after him, but before we got on terms he went into a deep nullah in which were some wild rose bushes standing in water. Nothing would induce him to show, though his grim form could be dimly made out in the not very thick cover.;

In the meantime Bob Crowdy's heat came along and 'Take the shot gun and tickle him up' was the instruction to me, the novice at the game. So, the gun taken from an attendant, it seemed simultaneous with the arrival of the insulting pellets that the boar had floored my pony and myself! Fortunately for us, when we recovered from the mix up, the pig had spotted one of the beaters and made for him. The man had the presence of mind to throw himself flat on the ground, and before any damage could be done Crowdy rode up and pricked the boar with his spear; he dared not spear heavily for fear of injuring the man. At this fresh insult the boar charged and Crowdy failed to stop him, not having any pace, and got his horse cut below the hock: then there was a general *melée* and the gallant fight was over.

My pony had been caught and brought to me, so I was in at the death of my first pig! Not indeed mine by virtue of 'first spear', but had I not tickled him up with the shot gun? And how soon had I learnt that the prowess of the great grey boar was no whit exaggerated.

In those days ponies were cheap to buy, and keep, so I soon owned some useful nags. The Sonopore Fair, where to this day you may buy anything from an elephant to a mouse, or an eagle to a quail, was perhaps the greatest event of the year. There was a great gathering of the planting community from far and near, to enjoy the ten days of business and pleasure for all and sundry assembled from most parts of India.

Wandering around on an elephant, the camps and native quarters could be seen to great advantage. There were streets of shanties rigged up as shops for sale of all sorts of goods; groceries, toys, curios, various liquids in many-coloured bottles; silks, muslins, beds, tables, and every conceivable article of furniture; carriages, carts, conveyances of all sorts. Doubtless in these days there will be bicycles and motor cars; and soon there will be aeroplanes!

Beyond the tents was the horse fair to which dealers, even from far Afghanistan, brought animals of every quality for sale. Good, sound, nags could be had, but the buyer needed his wits about him for he was bargaining with some of the most astute horse-copers in the world.

It used to be a great sight to watch the many elephants being bathed in the waters of the Gandak, just as one sees them near Kandy in Ceylon and at other places at the present day. Lying down in the water they are well scrubbed with a brick, then over on the other side, obedient as any child, and when that has been well cleaned, off to the sugarcane mart and away to camp for a feed for man and beast.

It was the Kabuli horses that we younger planters used to buy, they being cheap as well as strong and hardy: round about Rs. 200 is what they cost us. There was racing on four alternate days, with a ball kept up until a late hour in the same evenings; and the evening drive round the race course when all Sonopore used to put in an appearance; and the polo and tennis and endless jollifications: what a hectic time of it we lads used

to have! I wonder if the great mango grove of a hundred acres is still as it used to be, affording welcome shade to the great concourse of canvas.

But let us get along to the best part of those days; the pig-sticking and hunting of jackal, wolf and fox. It would be wearisome to relate the happenings of many hunts, but there are incidents which stand out in the memory. One such was the day when an elephant was cut about a foot below the root of the tail! You would not think that possible? This was the way of it.

On the day of that memorable incident four spears were out, and a fifth man was on an elephant with a shot gun, for the ground to be beaten was covered in heavy thatching-grass. The line of beaters started a fine boar. He broke just under my pony's nose: we nearly trod on him. A real fighting pig he was, and we were unable to get him out of the grass. As he lay up and would not show himself the elephant was called up to push him out, but the pig turned the tables on the *hathi* for he instantly charged; and as the elephant turned tail gave him two good cuts on the leg. On receiving these hasteners the frightened elephant stumbled for some cause and half sat down—which was the pig's opportunity to give him a real swiipe of a cut in a nice soft place! Our pal with the gun fell off, almost on top of the pig, but Crowdy near by covered the fallen warrior with a spear, so enabling him to get clear without damage. But the pig got home on C's horse and cut him badly in the hock; yet, even in that thick stuff, Crowdy managed to get in a mortal spear so that fighting boar died without a sound.

As we all know, the throwing of a spear is a very dangerous thing. An excitable member of our community twice did this when out with me. We were riding a small boar which had broken cover and made for some 'jhow' in a river bed. Seeing the pig escaping into this G, old hand though he was, hurled his spear at the vanishing porker: the spear rebounded and cut the thigh of a cooly near by, for the turn of the hunt had taken us towards the beat. Fortunately it was not a serious wound, but it might have been.

That incident, however, was insufficient brake upon the excitable temperament of my friend, for a month later, when two nice boars broke and we were hard after them they jinked back and made for cover. We had cut out the larger of the two and were riding him for all we were worth, but the distance was too short. G stood up in his stirrups and hurled his spear at the disappearing pig; the spear point imbedded in the ground and G rode on to the leaden butt which caught him a heavy jolt over the liver. Lucky it was not the business end! He is not long gone to other hunting grounds, for he died about three years ago.

Pig-sticking risks are many and various. Buffalo wallows concealed in the long grass, the deep foot-marks dried in the fierce sun, were always a potential danger. One of us had a fall in one of these, and being spread-eagled in front of his mount,

the spear still fast in his hand and the point backwards, speared the mare in the neck; a deep wound. As often as possible we used to have a Native Veterinary Assistant out with us and he was fortunately handy; so the wound was quickly seen to, and healed in about a month.

An accident which happened in Purneah, next country to ours, created a great stir at the time. G.-W and another, B, were riding a pig. B was on the pig and came down in the blind going. G.-W close behind saw this and tried to pull out, but his horse also came down and he was thrown on the point of B.'s spear which entered under the left breast and came out under the left shoulder blade. Instead of being instantly killed or mortally wounded, as one would imagine, no serious damage was done! The spear could not be pulled out from the front so was straightaway cut off close to the chest and pulled out from the back. Within a month the wounded man was fit and well, a most marvellous recovery from an apparently fatal wound. He rode pig afterwards and died twenty-five years later from causes unconnected with the injury.

One day, when we were all having a rest and a drink, with the half dozen beating elephants taking their ease a short distance behind us, there was a sudden uproar among the animals. A fine tusker, whose mahawat had left him for some purpose of his own, rushed at another, overthrew him by the unexpected assault, and savagely prodded him with his tusks, one of which penetrated deeply behind the elbow. The missing mahawat rushing up with a stick in his hand, belaboured the offender to the accompaniment of a fine vocabulary of abuse and actually beat him off in that way, while the other elephant attendants had been powerless to make the brute desist from his attack. The poor beast died a month later from his injury.

It is a common saying that 'where a pig can go a horse can go' and this is almost literally true; but sometimes it is not possible. The deep fissures of the parched alluvial soil, much of it very blind owing to high grass and scrub, were always dangerous, but it was surprising how seldom bad falls occurred over such ground. It was the pace that did *not* kill, for in speed lay safety for man and beast, as all who have experience well know. Sometimes horses used to be badly staked by the sliced tops of cut crops such as 'arhar', castor oil, and the like; and on one occasion a horse lashing out at a pig tore off the tush which remained imbedded in the soft part of his heel!

Bees sometimes caused a complete dispersion of sportsmen and beaters, the unfortunate animals suffering much on such occasions as they were unable to dive into the thick foliage of some bush, or to cover vulnerable spots with a portion of clothing. Their only protection lay in maddened flight which sometimes extended to miles.

The vitality of the wild boar is extraordinary, and I once saw a pig take thirteen spears before succumbing without a sound. Of course a good spear in a fatal spot is speedily fatal—but every spear is not so delivered.

There were two kinds of boar in our country, at least so we non-naturalist pig-stickers considered; and they had different dispositions, the grey being the more fierce and pugnacious. A vicious and implacable foe when roused he always showed better fight than the black variety which would sometimes utter a dying squeal, which the grey boar never did. The two differed much in the slope of the skull, that of the black pig being high over the frontal bone and not very deep in proportion to length while the grey boar had a skull not markedly high but long, and receding in proportion to height. The black boars grew to a great size and the grey were, on the whole, smaller and more slightly built animals. The young of the grey pig were striped at birth, whereas those of the black were unstriped and of uniform black colour.

With an incident which might have been a tragedy I will end these sketchy reminiscences. G and B were in one beat, and W and self on the other side of the cover. The boar headed for the railway embankment, G and B on his tail. The line being of recent construction was unfenced. W and I having followed on arrived as the pig was speeding up the slope. G was met as he topped the edge of the embankment by the charging pig and delivered a good spear, rolling the animal down into a borrow pit. Almost in the act of spearing a train thundered by within a few feet of the excited rider. What a mess there might have been!

Now let us sing the good old song. No heel taps!

I would like to sing, but, I am sorry to say, I cannot accurately give the words of 'The Great Grey Boar' and do not know where to find the correct version.

It is fitting to close with those lines of Lindsay Gordon's in 'The Sick Stockrider':—

In these hours when life is ebbing, how those days when
life was young
Come back to us; how clearly I recall
Even the yarns Jack Hall invented, and the songs Jem
Roper sung;
And where are now Jem Roper and Jack Hall?

ON THE BIRDS OF THE KISHENGANGA VALLEY,
KASHMIR.

BY

MAJOR R. S. P. BATES, M.B.O.U.

ITINERARY.

- April 16. Arrived Domel (2,200 ft.) by the Abbottabad route.
" 18. Domel to Pateka (2,670 ft.). 15 miles.
" 19 to 21. Remained at Pateka.
" 22. Pateka to Dhanni (3,200 ft.). 10 miles.
" 23. Dhanni to Tithwal (3,487 ft.). 8 miles.
" 24. Remained at Tithwal.
" 25. Tithwal to Salkalla (4,500 ft.). 17 miles.
" 26 and 27. Remained at Salkalla.
" 28. Salkalla to Keran (4,990 ft.). 10 miles.
" 29 to May 6. Remained at Keran.
May 7. Keran to Reshna (5,900 ft.). 14 miles.
" 8. Reshna to Sharda (6,130 ft.). 13 miles.
" 9 and 10. Remained at Sharda.
" 11. Sharda to Kel (6,544 ft.). 14 miles.
" 12 and 13. Remained at Kel.
" 14. Kel to Janwai (6,906 ft.). 15 miles.
" 15 and 16. Remained at Janwai.
" 17. Janwai to Taobat (7,400 ft.). 14 miles.
" 18. Taobat to Badwan (Gura's) (7,900 ft.). 14 miles.
" 19. Remained at Badwan.
" 20. Badwan to Bagtor (7,700 ft.). 9 miles.
" 21 to 29. Remained at Bagtor.
" 30. Bagtor to Koragbal (8,400 ft.). 5 miles.
" 31. Koragbal over the Razdhainangan Pass (11,586 ft.) to Tragbal,
and thence to Bandipur and Srinagar on June 1 and 2.

NARRATIVE.

Ornithologically the Kishenganga is little known for the simple reason that the easiest and usual way of exploring Kashmir's many valleys is to go direct to Srinagar to arrange kit, supplies, and transport and to commence explorations thence. The route from Srinagar to Gilgit certainly traverses the extreme upper end of the valley through Gurais, but the stretch of the Kishenganga flowing through that very beautiful district comprises but one twelfth of its length from the junction of the Tiel and Burzil streams to the river's confluence with the Jhelum at Domel.

My wife and I had always longed to see Gurais, so the idea of combining a visit there with a study of the Kishenganga's birds proved an irresistible attraction in spite of a number of disadvantages in the scheme, the main one being that I had to take my leave from April 15 to June 14. This I knew before we started to be, even in normal times, a good month too early for my purpose, but the weather in the first half of April this year was most unusually wet and cold. The result of course was to all

intents and purposes that we were always moving up about three marches behind the snow level. In consequence practically none of the birds which I particularly wished to study and photograph, with the exception of three or four very early breeders, had begun to contemplate nidification. This made it almost impossible to separate residents from migrants and to determine exact breeding limits.

The itinerary given above will I trust give the reader some idea of our travels but it requires amplification.

We arrived at Tret on the evening of April 14 to hear that the Murree-Kohala road was entirely blocked by snow and landslides and certain to remain blocked for some days. The following morning we gloomily retraced our steps to Rawalpindi only to find that the road via Abbottabad was also breached five miles or so from Domel, but feeling that a possible walk of five miles could not be allowed to interfere with our programme, we set off forthwith and reached Garhi Habibullah the same evening. By next morning the road had been cleared, and in consequence we were soon at the Domel Dak bungalow. Alas! a telegram there intimated that servants and supplies coming down from Srinagar were held up indefinitely by further slips near Uri.

To enable a start to be made at the earliest possible moment, I went off to the Thesildar at Muzaffarabad to arrange transport, either coolies or ponies. Ponies, I was informed, are not to be had in the lower Kishenganga. Mules are used but the Thesildar was not optimistic. The heavy rain had played havoc with the track—it can hardly be called a road—along the Kishenganga, and an important bridge across a side nullah had also been swept away. He arranged to send us 26 coolies which he said could not possibly be expected to turn up before 11 o'clock on the 18th. It being then the 16th, I banked on our kit arriving and fixed up accordingly.

The following morning a worried Zaildar called upon us. His object was apparently to dissuade us from attempting the journey upon which we had set our hearts. I think he was afraid for my wife, but he did not know her determination nor that she is undoubtedly surer of foot than I am. Besides, it is extraordinary what one can accomplish when the only alternative is to go back all the way one has come. There are few routes over the hills out of the Kishenganga Valley and they are almost impracticable until well on into May. According to the Zaildar the path was so awful that we might reach Tithwal, only three marches up the Valley, in a fortnight or three weeks. Actually we were there in less than a week but nevertheless he was right about the state of the track, and after those first three marches we both felt quite competent to take on any goat over ground of its own choosing.

Our kit fortunately turned up on the 17th, so by the following morning everything had been sorted out and repacked into fifty-pound coolie loads in time for the proposed start. The promised coolies did commence to appear roundabout 11 o'clock, but they were a very mixed crew. A good hour and a half was wasted

wrangling over loads and it required a vigilant eye to see that each coolie had anything like a full one, added to which the coolies of these parts carry their loads unroped on their heads or shoulders instead of across their backs in a sensible manner. A string of gurgling camels would have been easier to deal with. It was long after midday before a start could be made.

The dak bungalow compound was seething with migrants. The previous day had seen the trees filled with Grey-headed Flycatchers and Willow-Warblers. The former had passed on but shimmering white streaks of beauty now proclaimed the place alive with Paradise Flycatchers, and just as we started a flock of five or six Black-throated Thrushes arrived, but whether the latter were bound up or down the valley I cannot say.

Birds seen at the beginning of this march were mainly those of the lower levels and plains including Jungle Crows, Common Mynas, White-checked Bulbuls, Drongos, Indian Bushchats, and by the river a couple of White-breasted Kingfishers, Himalayan Whistling Thrushes, many Plumbeous and White-capped Redstarts, and to my surprise on a patch of boulders a mile or so beyond Muzzaffarabad a Pied Chat. A second one was seen a little way further on.

A couple of miles or so from Domel the Kishenganga roars from a gorge of thoroughly impressive dimensions, and from there for over thirty miles to Tithwal it can be said with truth that the valley is but a narrow gash in the mountains with a precarious path scratched out on its flank, sometimes high above the seething water; sometimes, but not often, approaching nearer its surface. From Tithwal to Keran the hillsides are perhaps less precipitous; again a gorge to Dudhnial, but inclined to be more often slightly less enclosed from there to Gurais. But throughout its entire length the river has cut a series of deep gorges with occasional fans and flattened spurs where large side streams flow in. Here of course are the villages, usually consisting of but a few houses, the inhabitants of which eke out a precarious existence by terracing every available spot into narrow fields in which they grow maize, corn, and to a lesser extent rice, maize being to all intents and purposes the sole crop from Keran upwards, in spite of the fact that Keran is only 5,000 ft. above sea level. The severity of the zemindar's lot is reflected in their weather-beaten faces and ragged clothing, and certainly in the lower reaches they struck me as being an under-nourished meagre race. The coolies of the lower tracts were a poor lot after the sturdy Kashmiris, and a thirteen-mile march with a fifty-pound load took them all day to accomplish.

At the eighth mile from Domel, at Ghori, the river is spanned by a suspension bridge. As far as this the road, a ledge cut for the most part in the gorge side, was in an execrable condition but by no means impassable. Numerous slips had occurred with abrupt slides straight into the river beneath, and across these a path a foot or so wide had been trodden. The first few were unpleasant to negotiate but there were so many that we quickly got used to them. From Ghori to Pateka the path was on the

left bank and crossed one or two spurs so was not so often abruptly over the river.

From Ghori too the country began to show a definite change. Bushes had certainly become more numerous and taller, but now open woods of long-leaved pines began to make their appearance on the southern bank, though these were mainly high up the mountain sides. It was not until the next march that the woods definitely grew down to the river's edge.

At Pateka I at once noticed Striated Swallows flying around the forest rest-house. We also heard Nightjars there but I failed to collect a specimen. They had the extraordinary habit of hawking insects at dusk high overhead well out of gunshot over the two stoney nullahs on either side of the hut. I failed to discover them in their daytime haunts and a nighttime expedition with an electric torch likewise drew blank.

From Pateka to Dhanni, a distance of but ten miles, took us all day, three coolies not getting in until nearly dark. First we had to negotiate a rushing torrent where the bridge had been destroyed, and shortly afterwards we were faced with a slip between three and four hundred yards wide where the whole hillside had literally fallen away. It was not as terrifyingly steep as it might have been, but rocks jutted out awkwardly in the worst places and slipping shale splinters made it necessary to go quickly for yards at a time, an unpleasant proceeding where the 'path' was but a series of imprints of coolies' naked feet. Our difficulties were further increased by our two dogs who would insist on trying to walk side by side. The cocker in one place developed cold feet and made an effort to get back along the path to his mistress past those who were leading.

At Dhanni Striated Swallows were again in plenty, so I did not add to the only specimen I had collected at Pateka, expecting to meet with them further on when building operations had commenced. Alas! we saw no more after entering the Tithwal gorge. 3,200 ft. seemed to be the limit of this race. I also ascertained that the Common Swallow was unknown in the valley. The Zaildar at Pateka was able to describe quite accurately the nesting of the Striated Swallow and told me they would have eggs in twenty days' time but said no Swallows ever built in the houses, and certainly I never saw one after leaving Domel.

Dhanni to Tithwal was an easy march, the latter half being through a very beautiful gorge. There were now a few trees on the right bank as well as scrub, and deodars with their graceful drooping boughs and symmetrical outlines made their appearance amongst the pines. Wild pear in blossom and some kind of fig tree also added their quota to the flora. Flocks of Blue Rock-Pigeons inhabited the craggy banks, and I was surprised to see a Large Cormorant wing its way swiftly down stream.

Tithwal, apparently usually called Karnah, was hot; the high hills enclosing it on all sides reflected the sun's rays as in a funnel, and we were pleased to quit it after a day's halt. There was an isolated colony of Common Mynas there and also a few House-Sparrows. No more of either were seen throughout the

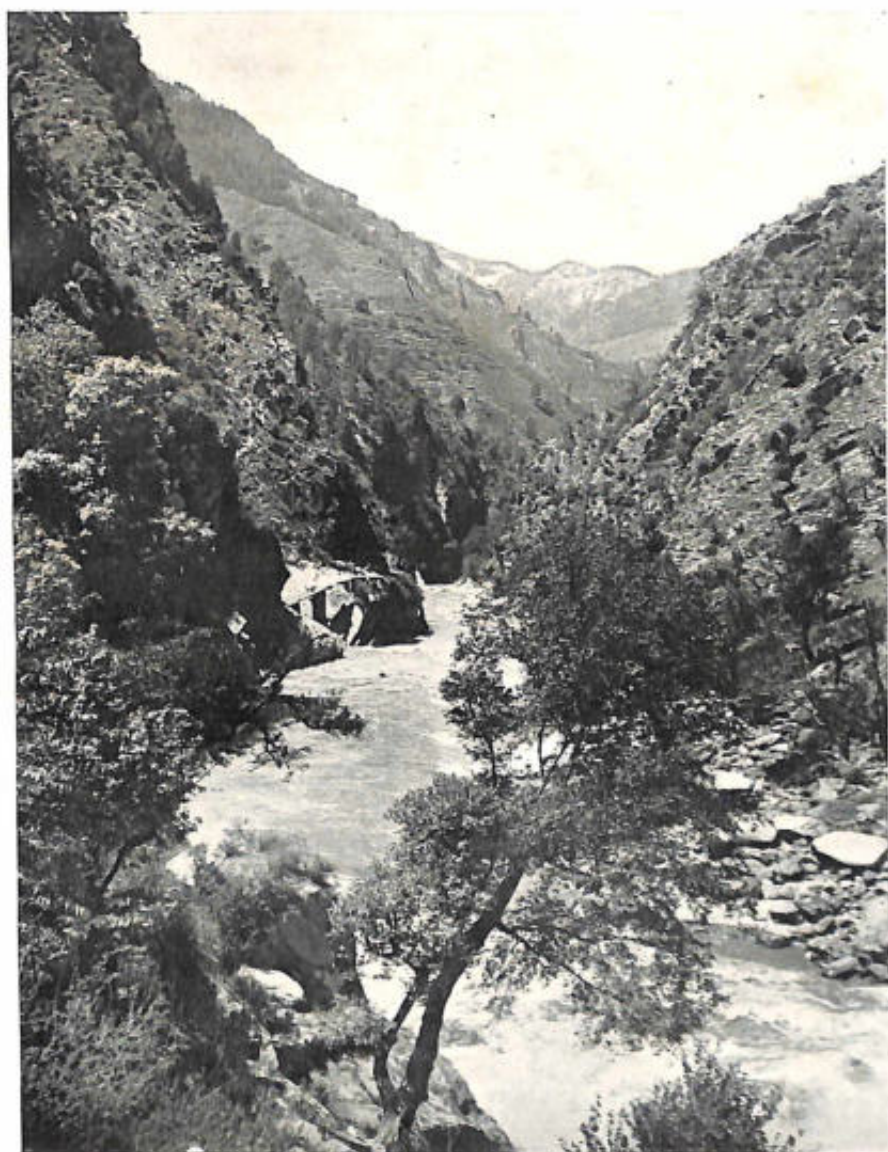
length and breadth of the valley until we again found the Sparrows in Gurais. It was here also that the last Paradise Flycatchers were noted, a single pair amongst some almond trees and one at Mirpur but a few miles further on.

At the entrance to the Tithwal Gorge I had an amusing hour or so trying to collect specimens of Alpine Swifts. They had their quarters in some crevices in a perpendicular cliff about forty yards above the path. A screaming band would literally hurtle past the crevices, one or two birds swinging upwards and rapidly creeping into a crack whence issued further chitterings. I regret to say that I expended ten cartridges without the least effect. The bands arrived over a little spur with such incredible speed that an aimed shot was an impossibility. I tried standing with the gun to my shoulder aiming at a favourite crack until I could stand the strain no longer when of course with a swish like a passing shell half a dozen birds would rush by. Browning being ineffective I attempted to get birds as they crawled into one of the narrow cracks. Twice I succeeded in peppering one, but each time it just seemed to shake itself and crawl in the faster. The range was too great for No. 10 shot and dust from the .410 bore. I returned in the evening with 6's but alas they had already retired for the night.

The next stage was a long one, approximately 17 miles to Salkalla. We arrived tired and thereby chose just about the worst camping ground we could have done. Next day we wondered how on earth we could have hit upon such a sandy spot when within two hundred yards was a comparatively grassy patch under a chenar quite close to the spring whence we drew our water.

Incidentally in three weeks we used the tents for as many days, so at Keran sent them back to Srinagar over the 10,000 ft. Pass which leads to Tregam and Sopor. Not only are there frequent forest rest-houses at convenient intervals all through except at Kel and at Taobat, but to find camping grounds anywhere along the whole length of the valley until one is nearly in Gurais is almost an impossibility. Where a flat space large enough to pitch a tent does occur, it is either incredibly dirty, having been well fouled by successive pack-mule caravans, or else it has been turned into a narrow field and consequently is either bearing a crop or in process of being ploughed up. I advise travellers to obtain permission to use the forest rest-houses—most of them have two rooms with just sufficient furniture—take one small tent for use in case of necessity and their own camp furniture. The use of each room is only eight annas a day, so not only does one save coolies, who are not always easy to collect in the lower reaches, but one saves considerable expense into the bargain.

A further change was coming over the birds. The zwang-zwang-zwang of Stewart's Bunting faded out somewhere in the neighbourhood of Salkalla and the Meadow Bunting took its place. Blue Magpies became common, Black Bulbuls excessively so, and Turtle Doves appeared. Scaly-bellied Green Woodpeckers were by no means uncommon. In fact one had reached a new zone of bird life. Salkalla is only 4,500 ft. above sea level but its bird



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Entrance to the Tithwal Gorge. Alpine Swifts occupied crevices in the cliff
face near the small bridge on the right.

population appeared to correspond with about the 6,000 ft. level of such valleys as the Sind and Lidar off the main vale of Kashmir.

At Keran we stayed a week. We were overtaking the snow level which was then only three marches ahead. Keran itself had experienced a late fall on April 14 but it also appeared a good place for birds. The woods were thicker—deodar, long-leaved pine, horse chestnut and other trees on both sides of the river, and the *Ilex* growth scantier. The latter, which had been much in evidence from below Salkalla soon after disappeared altogether. There are also two big villages and a considerable crop area as a stream flows into the main river on each side. Chukar abounded on one slope. The Blue Magpie parties were breaking up into pairs: Pied Woodpeckers appeared, and altogether we had an interesting time.

Alas! few birds except Whistling Thrushes, Plumbeous Redstarts, and Brown Dippers, whose photographs I already have in plenty, had really got down to nesting, so bird photography was still at a discount, but the list of species noted soon swelled to the neighbourhood of ninety. The first Crested Black Tit and the first Simla Black Tit were noted, while Short-billed Minivets in large bands were most numerous. Pipits I still did not meet. In fact I had only seen one in the neighbourhood of Dhanni when I was without my gun.

The stretch from Keran to Sharda we did in two instead of the usual three marches, but the 14 miles to Reshna is better done in two stages, halting at Doarian where there is another F.R.H. Doarian to Reshna is decidedly hard going, the path having to ascend through the forest some hundreds of feet to surmount the towering cliffs of a narrow rocky gorge.

At Sharda I heard Thrushes singing a few hundred feet above the rest-house. They turned out to be Grey-headed Thrushes and were mating. I also saw here a Blue-headed Rock-Thrush for the first time and a Missel Thrush. The forest was thoroughly suitable for the Grey-headed Thrushes. Many chestnut trees, just unfolding their leaves, were growing amongst towering forest giants of deodars and silver and spruce firs, numbers of whose rotting trunks were strewn over the steep hillsides collecting drifts of melting snow against their slippery decaying sides. A thin, as yet leafless, parrotia scrub formed the undergrowth.

By the time we reached Kel on May 11, a further change had come about. The deodars had almost disappeared and the firs predominated, though long-leaved pines were again common. Unfortunately these close-growing fir forests which now persisted for the rest of our trek to Gurais contained little undergrowth, so a great many birds which prefer woods of a more mixed character were absent or rare. Wide snow drifts across every nullah and stream slowed up one's rate of march. On the south bank snow was still lying in the forest, and here I heard and saw the first and last Yellow-billed Choughs. 6,500 ft. is surely a very low altitude for these birds even in early May.

We had thoroughly bad luck at Kel, the one and only stage where no forest hut of any kind exists. Shortly after our arrival

the temporary bridge over the Barai nullah, within three hundred yards of which we had pitched a tent on the roof of a deserted hut, was swept away, and we were let in for an enforced stay of three days. I regret now I did not climb the hill immediately behind our camp as I believe a good view of Nanga Parbat, but thirty-five miles away, is to be obtained from its summit.

Fortunately for us the lambardar of Kel was an enterprising soul and nobly turned out a stout band of villagers who, with the help of men from a small hamlet on the other side, threw a primitive cantilever pine-log bridge across a narrows. Unfortunately it entailed a detour of two miles up the nullah and an appalling scramble over snow shoots and the steepest of slopes before we were back on the path. Nevertheless we shall remember the lambardar of Kel with real gratitude.

Our troubles as regards the path were now practically over. We still had a few tricky places to get across—one where a snow bridge had collapsed and we had to descend the stream between deep snow walls splashed by the iciest of waterfalls and crawl under the overhanging lip along the river edge, a by no means pleasant experience, and I for one heaved a sigh of relief when the last coolie was through, as a block of snow the size of a house looked ready to crack off at any moment.

We spent two full days at Janwai and then made for Taobat. Between Kel and Janwai the forest on both sides of the river was amazingly thick, but now, six or seven miles short of Taobat, the valley at last really did open out. The slopes still went up straight from the river but at a gentler angle. Villages and cultivation were more in evidence: one could actually see hilltops and margs. The fall of the river was less and the din of churned up seething mud-stained water diminished. It frequently widened out enclosing a few islands and at last the querulous twitterings of Sandpipers were frequently heard. I had seen but one or two of these birds all the way up and had come to the erroneous conclusion that the Kishenganga was not to be counted as one of their best-loved routes from the plains. It was now, and only now, that we fully realised the extraordinary nature of the valley we had traversed. For 120 miles we had walked through fearsome gorges until we expected nothing else. At last we were in country more like that to be found in the better known valleys of Kashmir.

After a somewhat draughty and chilly night at Taobat as our shelter consisted of a large one-roomed hut with wooden-barred openings on opposite sides for windows, a 'kuth' store, we went on to Gurais.

The river here takes a wide double bend between heights of 13,000 ft. or so and passing along this bend we could not help feeling that we were in a milder more hospitable clime. This seemed to be definitely true as I began to note again birds which we had left behind at considerably lower levels. At Bagtor Rufous-backed Shrikes re-appeared and at Gurais itself House-Sparrows outnumbered Cinnamon Tree-Sparrows by twenty to one, while Sandpipers became increasingly numerous.



But we were not impressed with Gurais. True the snow had hardly melted: flowers were practically non-existent, and the weather broke. Perhaps we had been expecting too much, but we had undoubtedly passed through much finer scenery. After a day's rest we therefore retraced our steps to the Bagtor F.R.H. two miles below Kunzalwan, charmingly situated on the edge of the forest on a sloping green marg still soaked with but recently melted snow, where bright blue gentians already starred the earth, and where irises were soon to cover the sward in wide patches. There we spent a thoroughly pleasant ten days from May 21 to May 30.

Migrants were still arriving. One day I suddenly realised that Sooty Flycatchers were about, hawking flies from the highest perches to which they would return again and again, while three days before we left I thought I heard a Blue Chat, soon confirmed as next day two were calling and thereafter they were everywhere.

On May 30 we left on the final stage to cross the Razdhainangan Pass and descend into the vale of Kashmir. There is little more to add. As we left Koragbal I heard the unmistakable five-noted call of the Large-billed Willow-Warbler and went on hearing it until we left the vicinity of the stream near Gorai. The pass was very trying. In spite of getting up at 4 a.m. in a sharp frost the snow was very soft and through it we had perforce to plod and slip and sink for nearly six miles before leaving it behind for good at the top of the Tragbal forest. A biting wind was blowing in our faces as we neared the crest and our toes were like blocks of ice but it was a perfect day and the views in all directions more perfect still.

As we trudged down the Tragbal forest I received ample confirmation of the rigour of the Kishenganga's climate compared with that of the vale of Kashmir and its immediate side valleys. Birds were much more numerous, the Meadow Buntings and many other birds obviously breeding freely, and below Tragbal the wild roses were glorious with many Hume's Lesser White-throats breeding amongst them. Nevertheless I soon ascertained that conditions really were abnormal everywhere, as after arrival in Srinagar my efforts to get at least a few photos of the water birds of the Dal Lake were quite abortive as the water was very deep and the birds I wanted only just commencing to build. As the Kishenganga from its very topography and climate is bound to be backward compared with the vale of Kashmir, it is not surprising therefore that I had found so few nests.

NOTES.

The following condensed notes may be of use to others taking the same route:—

(1) Kashmir always experiences rainy weather in the first half of April. In a valley of the character of the Kishenganga, this is bound to result in frequent landslides rendering the path unfit for anything except lightly laden coolies.

(2) Repairs to the path are only considered after the better weather has set in and the snow melted in the upper reaches, and take considerable time to effect.

(3) From approximately Sharda the danger from avalanches and landslips is not over even in normal times until well on into May. Thus

(4) one cannot count on being able to use animal transport until the beginning of June.

(5) The forests of the valley are divided into three divisions:

(a) Muzaffarabad Division,

(b) Keran Division, and

(c) Sindh Division.

In order to use the forest rest-houses permission must be obtained from the respective Divisional Forest Officers whose offices are at Muzaffarabad, Keran, and Bandipur.

(6) These F.R.H.'s have furniture, including bathroom utensils, with the exception of Janwai F.R.H. which had nothing.

(7) There are no F.R.H.s at Kel and Taobat, but at the latter place is a large one-roomed shed which may be used. There is of course no cook-house or servants' quarter along with it. The Bagtor F.R.H. is $5\frac{1}{2}$ miles further on but this makes it a twenty-mile march from Janwai—not impossible of course provided the path has been repaired and one can use ponies as the going is good except over one or two short stretches.

(7) Tentage may be used in place of going to the rest-houses but places to pitch them are difficult to find until after Janwai, the only available ground often being in the F.R.H. compounds.

(8) Milk, eggs, chickens, and sheep are obtainable. Butter is not good and the sheep are miserably thin as the grass is of scant growth until June. Vegetables are quite unobtainable with the exception of dandelion leaves which make quite presentable spinach.

(9) The time of year to undertake the trip is rather difficult to advise upon, as the lower end of the valley warms up very quickly. Even on April 24 we found Tithwal decidedly hot. But if one starts too early one overtakes the melting snows and finds the path frequently blocked or damaged. Personally I would advise starting in the first week of May and moving up more slowly than we did.

(10) Should one wish to strike into the valley instead of starting from Domel, there are three good passes leading from Kamraj or the Lolab to Tithwal, Keran, and Dudhnial. These are not likely to be practicable for ponies until well on into May or even early June.

SYSTEMATIC LIST.

(1) *Corvus macrorhynchus intermedius*.—Jungle Crows were common all along the line of march and were noted to be building in April; namely at Dhami on April 22, near Tithwal carrying lining material on April 23, and at Salkalla on April 27.

(2) *Corvus splendens*.—House-Crows were totally absent from the valley. Villages like Tithwal and Keran might have been expected to harbour colonies of this crow but the last I saw were near Abbottabad in Hazara.

(3) *Corvus monedula*.—This bird also has really no place here as it was never met with. A pair were however seen not far from Garhi Habibullah in Hazara shortly before crossing over into the Kishenganga Valley.

(4) *Urocissa flavirostris cucullata*.—These beautiful birds were very commonly met with in the lower parts of the valley, the last, a party of three, being seen a couple of miles beyond Dudhnial at an elevation of approximately 6,000 ft. on May 8. More often than not they were in small flocks but single pairs were not infrequently met with. For instance, we had two pairs near us at Keran occupying territory on either side of the Rest-House. Stuart Baker, *F.B.I.*, 2nd Edition, vol. i, remarks that they haunt principally evergreen forests and heavy jungle. I would rather put it that they haunt the outskirts of evergreen forest and heavy jungle, seldom if ever being found far within the latter, unless well provided with glades dotted with trees and tall bushes. They often visit cultivation where it lies close to forest, and I have not infrequently seen them hopping about ploughed fields in a most ungainly manner.

(5) *Garrulus lanceolatus*.—On April 26 I procured a female which flew across a small patch of cultivation into some light mixed forest by the river side at Salkalla. The ovary was slightly developed, having a granular appearance. A pair was seen in similar country three miles from Salkalla on April 28 during the march to Keran.

(6) *Nucifraga multipunctata*.—A single bird was seen at Keran on April 30 on the edge of the forest by the F.R.H.

(7) *Pyrhocorax graculus*.—A party consisting of some thirty birds was seen on May 12 at Kel. Taking advantage of the air currents they circled rapidly up a rather bare steep nullah behind our camp and were soon lost to view. None was seen elsewhere, not even during our crossing of the Razdhainangan Pass.

(8) *Parus major cashmirensis*.—Very common as far as Sharda after which they became progressively scarcer until the last one was seen and shot on May 17 five miles beyond Janwai at an elevation of 7,200 ft. At Keran at the beginning of May they appeared mostly to be concerned with searching for nesting sites, but the specimen procured near Janwai proved to be a breeding male.

(9) *Parus monticolus monticolus*.—A single pair was remarked at Keran on May 3 in some mixed forest about 300 ft. above the F.R.H. They were not uncommon at Sharda.

(10) *Lophophanes melanolophus*.—First noted in the Keran Forest at 5,300 ft. on May 1. Thereafter it was met with at each halt to Bagtor. The next species, however, seemed to be the common Black Tit of the Kishenganga.

(11) *Lophophanes rufonuchalis rufonuchalis*.—Also first seen at Keran, on May 5, where it was undoubtedly more numerous than *melanolophus*. It was in fact the commonest Tit seen from there right up to Gurnais, and most of the Black Tits on which I levelled my glasses turned out to be of this species. A pair was watched inspecting holes in the ground for a nesting site in the forest on the edge of the path near Kunzalwan on May 18. I am quite convinced that numbers of Black Tits' nests taken from holes in the ground in the forests of the Kashmir valleys and recorded as *melanolophus* are in reality those of *rufonuchalis* and that the bird is much commoner throughout Kashmir than it is recorded to be. I am sure that I have unfortunately been guilty of the error myself. The two birds are not very easy to differentiate except at the closest range with glasses.

(12) *Sitta leucopsis*.—Marching back to Bagtor from Badwan on May 20, I heard a very harsh call issuing from the summit of a tall spruce fir. Two birds of the size and shape of Nuthatches flew out and across the path into the thick forest on our left. Judging from their notes I consider they must have been of this species. They were the only Nuthatches seen throughout the valley.

(13) *Trochalopteron lineatum lineatum*.—Evidently a common bird throughout the valley wherever ground suited to its requirements occurs. Although an arrant skulker it does not mind leaving cover if undisturbed. A pair haunted the compound of the F.R.H. at Tithwal although it could boast of but three bushes capable of affording any protection from view. Near Sharda I saw one out in the middle of a ploughed field, while at Bagtor one was actually noted sitting on the roof of a house. It only shuffled away when I approached and levelled the glasses in its direction. They possess a very plaintive unmistakable three-noted danger call of 'twee-twee-twee'. Two males shot at Pateka on April 20, which I had taken for a paired couple, had the testes enlarged to the size of peas but a search for a nest only produced a last year's one.

(14) *Microscelis psaroides psaroides*.—From Muzaffarabad, where I saw a pair in the trees of a cemetery just before getting into the gorge, to Keran (5,000 ft.) these birds became increasingly common. I saw a pair at Reshna (5,900 ft.), 13 miles further on, but none after that, although I thought I heard their harsh notes once at Sharda but may have been mistaken.

(15) *Molpastes leucogenys leucogenys*.—Common as far as Tithwal. I noted one or two at Salkalla (4,500 ft.) but none beyond.

(16) *Certhia himalayana limes*.—The first Tree Creeper was noted at Pateka on April 24. This bird, a female, was not in breeding trim. Others were seen at Keran, Janwai, Bagtor, and Badwan. At Bagtor they were very numerous. A male shot at Janwai on May 16 had the testes greatly enlarged. Hodgson's Tree-Creeper was not noted.

(17) *Troglodytes troglodytes neglectus*.—I did not come across this cheerful little songster until I had climbed to about the 8,500 ft. level into a rocky rather gloomy patch of forest in the Gishat nullah at Bagtor on May 24. I heard them again after passing Gorai on the way up to the Razdhainangan.

(18) *Cinclus pallasi tenuirostris*.—Exceedingly common along the river, and its side streams, over its whole length. Young birds strong on the wing were seen from Pateka in April to Badwan and Bagtor at the end of May. One bird was observed sitting, presumably on eggs, in an inaccessible nest at Tithwal on April 24. Although undoubtedly an exceedingly early breeder, the nesting of this bird is very prolonged, to a certain extent depending on elevation. I have seen young ones in the nest at between eight and nine thousand feet in the Lidar Valley as late as August.

(19) *Tarsiger brunneus*.—This bird only put in its first appearance on May 28 when I recorded that I thought I heard its notes once in the Gishat nullah at Bagtor. I had ample confirmation next day when I heard two at once on either side of the F.R.H. Thereafter they became increasingly numerous.

(20) *Saxicola caprata bicolor*.—Not uncommon at Domel and seen again at Pateka between April 18 and 21.

(21) *Saxicola torquata indica*.—Common throughout the valley. Signs of breeding were noted from the end of the first week in May.

(22) *Rhodophila ferrea ferrea*.—Common at both Domel and Pateka. None seen further up the valley.

(23) *Genanthe picata*.—On April 18 I saw one of these birds on a stoney patch just opposite the old fort at Muzaffarabad and another one a little further on, likewise amongst stones and boulders.

(24) *Enicurus maculatus maculatus*.—Noted at Keran and Sharda on May 1 and 10 respectively. From their behaviour I am sure the Keran pair had a nest but I failed to locate it. This bird is probably much commoner in the Kishenganga than it appeared to be but I visited few streams suitable to its habits, except at Bagtor, where, however, I never came across it.

(25) *Microcichla scouleri scouleri*.—Generally connected with mountain torrents in the steepest of nullahs well provided with waterfalls where this little bird can play about in the spray. At the Gehl nullah between Tithwal and Salkalla

on April 25, one was seen right underneath a voluminous fall and another in a typical situation at Janwai on May 14, but two miles beyond Dudhnial, where the river for once flows serenely between wide banks, I was surprised to see a Little Forktail pottering around a boulder some ten yards out from the near bank. We did not pass a side stream for another quarter of a mile. This was choked with snow and had very little water in it.

(26) *Phoenicurus frontalis*.—One was noted in Gurais on May 19 feeding in a patch of viburnum near Wampur village.

(27) *Chaimarrornis leucocephala*.—Common everywhere along the main river and also to be seen on the larger streams. In my opinion the majority of these Redstarts breed late, from the end of June, and move up very leisurely from the lower winter levels to their breeding grounds in the neighbourhood of eight or nine thousand feet upwards. A male, shot at Bagtor on May 23, had the testes greatly enlarged and appeared to be breeding.

(28) *Rhyacornis fuliginosa fuliginosa*.—As common along the whole length of the Kishenganga as along the other Kashmir rivers. I noted no signs of nest building until we were at Keran at the end of April. From the beginning of May many pairs had commenced nidification, and at Bagtor on May 27, the only time I really searched for them, I found nests both being built and containing fresh eggs.

(29) *Calliope pectoralis pectoralis*.—The first one seen was feeding in some viburnum bushes twenty yards from the Bagtor F.R.H. on May 29. It was a male with organs developing and may have been driven down from higher levels by the stormy weather we had experienced on that and the two previous days. The next one I saw was sitting unconcernedly on a stone by the broken bridge near the remains of the Gorai dak bungalow.

(30) *Ianthia cyanura pallidiora*.—First noticed near Badwan on May 20, but on our return to Bagtor I found them very common there, often coming out into the viburnum shrubs running along the edge of the forest. On May 21 I shot what I thought was a female, only to find it was a male in immature plumage with testes well enlarged. A second one in full plumage shot the next day appeared to be hardly contemplating breeding.

(31) *Copsychus saularis saularis*.—As usual there was a pair in the Domel dak bungalow compound, and I saw one by the roadside as we passed through Muzaffarabad.

(32) *Turdus boulboul*.—A dark unicoloured Thrush with an orange bill, which I took to be a female of this species, was seen quietly feeding on the ground in a small bagh three miles from Pateka on April 22.

(33) *Turdus rubrocanus rubrocanus*.—Only met with at Sharda, May 8 to 10, although a fine song heard near Gorai at 9,000 ft. on our way to the Razdhainangan Pass on May 31 was attributed to this species, as well as a number of old nests on the edge of the fir forest at Bagtor. At Sharda it was common above the rest-house and a male shot there had its testes greatly enlarged. They appeared to be mating as no less than five were seen at once chasing one another about the wood to an accompaniment of much cackling. As already stated the forest here was most suitable for them. After Sharda it was composed mostly of silver fir and spruce and was very thick and lacking in undergrowth.

(34) *Turdus atrogularis*.—A party of these Thrushes flew into the tall trees in the Domel dak bungalow compound just as we were preparing to leave on April 18.

(35) *Turdus unicolor*.—Only noted at Keran where I shot a male with greatly enlarged testes out of a pair which flew over the F.R.H. on May 3. Another bird was seen on the Nilam plateau near Keran two days later.

(36) *Arceuthornis visivorus bonapartii*.—One seen at Sharda on May 9 and another at Janwai on May 16.

(37) *Monticola cinclorhyncha*.—First recorded at Sharda where I saw a male on May 10 when watching the Grey-headed Thrushes. I heard the song on

several occasions during the remaining marches to Gurais and found them to be fairly common at Bagtor. I spent two whole days towards the latter end of May looking for their nests but without success. The pleasant though rather monotonous song of the male, so often rendered from the very pinnacle of a pine or fir tree, renders this bird easily traceable.

(38) *Myophobus caeruleus temminckii*.—Common everywhere and numbers had nests even from the date of our arrival in Domel, although I think few birds were then at the stage of incubating eggs but merely building. On May 11 between Sharda and Kel I observed three nests on ledges of the steep rock face of the further bank of the river within less than fifty yards of one another. On two of them birds were sitting. The other nest was visited twice. At Janwai there was a nest with three fresh eggs in it on a rafter of the F.R.H. verandah, while at Taobat one had actually built on a beam inside the shed in which we spent the night.

(39) *Prunella strophiata jerdoni*.—A male was singing on a branch just over our heads shortly after we got into the forest at Gorai (9,000 ft.) on May 31. It was obviously breeding, its testes being very greatly enlarged.

(40) *Hemichelidon sibirica gulmergi*.—I only became aware of the presence of these birds after we had been at Bagtor some days, that is on May 25, when I came on quite a party near the mouth of the Shalput nullah. One pair appeared to be building near the end of a branch high up in a fir tree. They have a very characteristic habit of hawking insects from a high perch to which they often return. After the date in question I saw many even around the F.R.H. They were very numerous at Koraghal in some birch trees on the evening of May 30.

(41) *Muscicapula superciliiaris superciliiaris*.—First noted at Salkalla. They were common at Keran where I watched a pair on April 30 fussing around a crack in an old split trunk. Both birds entered the cavity repeatedly although I was but four feet away. They eventually rejected it as a possible nesting site. I saw none beyond Reshna.

(42) *Eumyias thalassima thalassima*.—One pair observed by a small stream on a bush-covered hillside at Pateka on April 20.

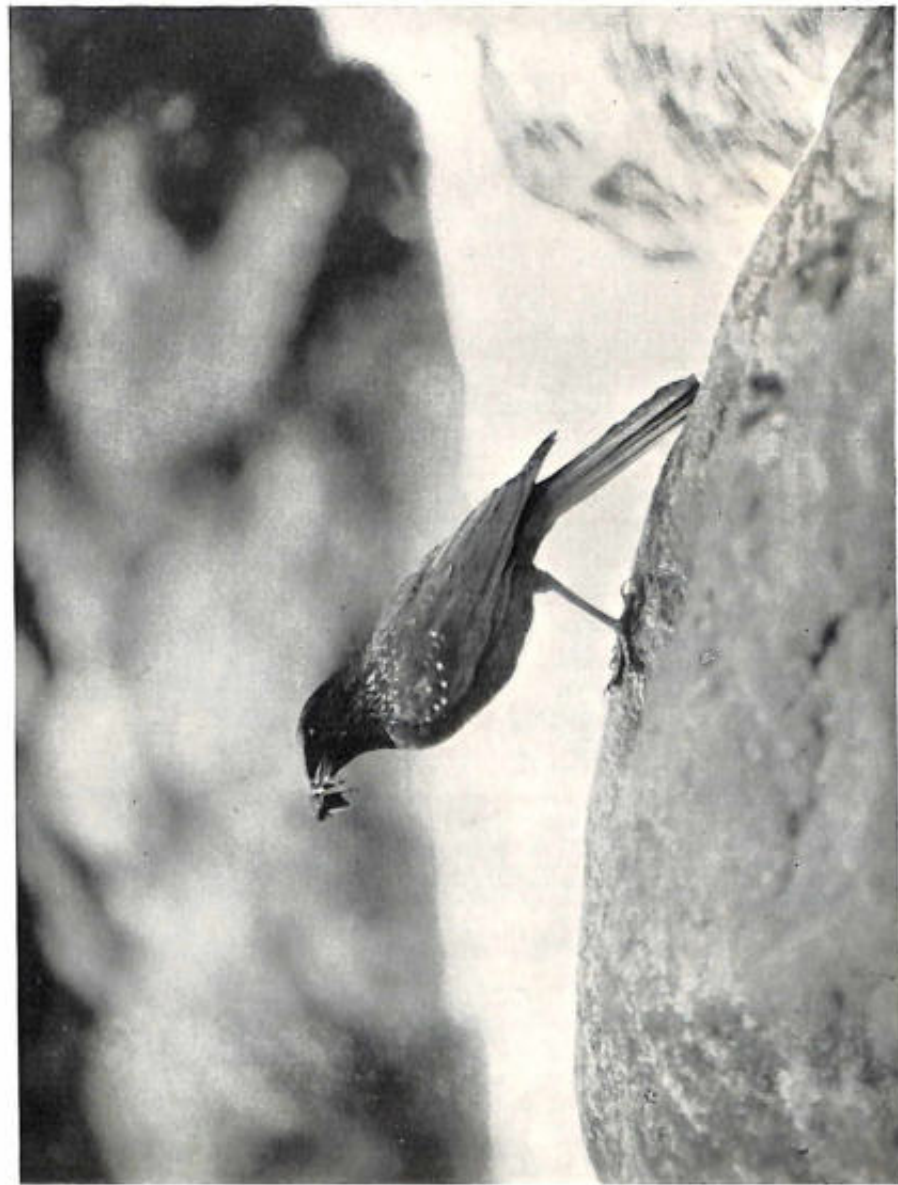
(43) *Alseonax ruficaudus*.—I first met with this rather unobtrusive Flycatcher at Keran. It may occur lower down the valley but until I had shot one I was not conversant with its notes and may have missed it. They were exceedingly common and breeding around Bagtor. Incidentally I found no trace of the occurrence of *latirostris*.

(44) *Callicapla ceylonensis pallidior*.—The trees of the Dak bungalow compound were full of these flycatchers all through the day of our arrival at Domel, April 16. The following day they had passed on; apparently up the Jhelum valley as only at Keran on April 29 did I hear the unmistakable notes of a single bird.

(45) *Niltava sundara whistleri*.—Seen in the Domel Dak bungalow compound on both April 17 and 18, possibly the same bird both times.

(46) *Tchitrea paradisi izucogaster*.—Numbers of these beautiful birds passed through Domel the day after our arrival there, April 17. I don't think I have ever seen so many as I did at Pateka during our three days' halt at that place from April 19 to 21. Nevertheless I only saw one pair at Tithwal (April 24) in some almond trees and a single bird five miles further up at Mirpur, elevation 3,700 ft., on April 25. I quite expected to see them at Keran but none had appeared when we left on May 7. In fact this striking bird seemed to be unknown to villagers I questioned around Keran. Between Dusut and Sharda, 6,130 ft., there are many little orchards of cherry and apple trees as the valley is somewhat wider but this is perhaps a little too high for them to penetrate to.

(47) *Lanius vittatus*.—A single bird attributable to this species was seen at the edge of a small copse between Tithwal and Salkalla at about 4,000 ft. on April 25.



(48) *Lanius schach erythronotus*.—Common at Pateka. We had a pair in the F.R.H. compound. I then saw them at Keran on the little plateau on which Nilam village stands, the elevation being about 5,400 ft., and shot a breeding male there on May 5. After that none was seen until we were passing through Bagtor where the river makes its abrupt turn into the wider milder Gurais valley. They were not uncommon in Gurais.

(49) *Pericrocotus brevirostris brevirostris*.—Noted immediately on our arrival in Keran where they were commonly seen in flocks of considerable size feeding through the forest often descending into the parrotia scrub. A male shot there on April 29 had the organs only slightly developed. They were common enough right up to Gurais, but from Keran onwards the flocks appeared to be breaking up into pairs.

(50) *Dicurus macrocerus albirictus*.—Became increasingly common as we approached Keran. At that place a pair near the F.R.H. were most aggressive and may have already been breeding. I have no records of any seen after Keran.

(51) *Sylvia althæa*.—On May 1, I shot the male out of a pair seen in the viburnum and rose bushes on the edge of the Nilam plateau near Keran. Its testes were enlarging. It appeared very suitable ground for them and they may well breed there. I saw them nowhere else.

(52) *Phylloscopus affinis*.—A small party of these diminutive but hardy warblers was noted on passage at Pateka on April 19.

(53) *Acanthopneuste magnirostris*.—The characteristic five-noted call of this Willow-Warbler was not heard until we were leaving Koragbal in the small hours of the morning of May 31. I heard them frequently as far as Gorai where we left the vicinity of the stream. A few days before leaving Bagtor I had noticed that a very plain-coloured Willow-Warbler had appeared in small numbers in the Shalput nullah. This bird, which was then silent, fed largely in low bushes and close to the ground on weedy grass-covered banks along the stream. A specimen, a male with testes enlarging, shot on May 25 in this nullah, turns out to be *magnirostris*.

(54) *Acanthopneuste occipitalis occipitalis*.—Noted commonly throughout the valley. In April in the lower reaches they were probably only on passage. But at Keran in early May I began to hear their plaintive danger call.

The commonest Willow-Warbler of all, especially in the fir forest zone, was a small yellow-rumped bird, almost certainly *Phylloscopus proregulus*. So many Willow-Warblers were only passing through that I shot none of this species intending only to procure specimens actually nesting. I rather suspect that this bird is a late breeder and none seemed to have commenced nidification when we left the valley.

(55) *Homochlamys pallidus pallidus*.—This little bird of the intriguing voice was heard at Pateka, Salkalla, and Keran, in all of which places it appeared to be fairly prevalent. Keran being but five thousand feet above sea level I expected to meet with it much further up the valley, but, although the hillsides on the north bank of the river at Sharda looked ideal for it, I never heard it there. Is its range in the Kishenganga very restricted or did we pass it at Keran moving up the valley even more slowly than we were doing?

(56) *Suya eriniger eriniger*.—Common at Pateka; heard again near Dhanni, and one seen on a bushy hillside at Keran at about 5,400 ft. A male shot at Pateka on April 19 in the thick bushes just by the F.R.H. showed that breeding was about to commence. Incidentally it seemed to be a well known bird there and had the local name of *phitta*.

(57) *Regulus regulus himalayensis*.—The only one recorded was seen in the fir forest in the Shalput nullah near Bagtor at about 7,600 ft. on May 22. Unfortunately I blew it practically to pieces. Its testes were enormous and very pulpy but I could find no nest.

(58) *Oriolus oriolus kundoo*.—A single bird flew across the river four miles from Pateka during the march to Dhanni on April 22.

(59) *Acridotheres tristis tristis*.—Common enough at Domel but met with them nowhere in the valley except at Tithwal where there is an isolated colony. I presume they must have worked their way from Kamraj over the comparatively low passes at the head of the Kazinag nullah.

(60) *Perrisospiza icterioides icterioides*.—On April 29 a flock flew past the F.R.H. at Keran and I heard their pleasant notes in the neighbouring forest for some time. I next met with this finch at Bagtor on May 24 and subsequent days, when I often heard and saw a small flock feeding through the forest above the rest-house. I also heard them in the Gishat nullah. On May 30 I saw some in the trees above the Koragbal Dak Bungalow shortly after our arrival there, and on the following day others were noted in the Gorai forest at about 9,000 ft.

(61) *Callacanthis burtoni*.—A single pair flew off the path between Badwan and Kunzalwan (7,800 ft.) on May 20 and as usual sat still and unperturbed on a rock quite close to us at the edge of the forest to let us go by before resuming feeding. I shot the female in the hopes of obtaining an oviduct egg but the ovary only contained yolks about the size of pin-heads.

(62) *Passer domesticus parkini*.—Only met with at Tithwal and in Gurais. Nowhere else in the valley. In Gurais they were very common, outnumbering the Cinnamon Tree Sparrows by about twenty to one.

(63) *Passer rutilans cinnamomeus*.—First noted three miles beyond Dhanni on April 23. This would be at an elevation of approximately 3,250 ft. They were common thence right up the valley though at Tithwal the birds in and around the village were *Passer domesticus*. Again in Gurais they seemed comparatively scarce where *domesticus* was once again very much in evidence.

(64) *Emberiza stewarti*.—Exceedingly common as far as Tithwal. Somewhere in the neighbourhood of Salkalla (4,500 ft.) they gave place to the Meadow Bunting, the latter being alone noted at Keran. A male shot out of a party at Pateka on April 19 had the testes only very slightly enlarged.

(65) *Emberiza cia stracheyi*.—Meadow Buntings were first definitely identified at Keran whence they were common all along the valley. The organs of a male and of a female procured on May 1 at Keran showed only slight development; those of a male shot at Janwai on May 16 were practically normal, but those of another male obtained at Bagtor on May 21 were considerably enlarged. Nest-building was first observed at Bagtor on May 24. As usual the ranges of *stewarti* and *cia* did not appear to overlap. Coming down the Tragbal forest it was also observed that the White-capped Buntings commenced where the Meadow Buntings ceased.

(66) *Melophus melanicterus*.—A male was noted as we crossed a small cultivated spur four miles from Pateka on April 22. On our way down from Srinagar on June 12, I noticed they were common from Garhi downwards.

(67) *Delichon cashmeriensis*.—I was particularly on the look-out for Martins, but in spite of passing excellent country between Kel and Janwai none was seen until May 25 and the following day when a party appeared out of the Shalput nullah at Bagtor. They were feeding over the marg high up with a party of Swifts, but after a time a band came fairly close and I brought one down with a lucky shot. Shortly afterwards the whole party returned whence they had come. From the map the only likely nesting place seemed to be near the mouth of the nullah but through the glasses I could make out no suitable cliffs or rocks.

(68) *Hirundo rustica rustica*.—Although seen at Domel, and I imagine large numbers must pass up the Jhelum, the Swallow was not seen and is apparently unknown in the valley. Many of the houses are constructed as in the vale of Kashmir but enquiries at Pateka elicited the fact that no Swallows built in the houses although the nesting of the Striated Swallow, which they called *phairni*, seemed to be well known to everyone.

(69) *Hirundo daurica scullii*.—The moment I went out of the hut the morning after our arrival at Pateka (April 19) I noted a pair of Striated Swallows flying round the compound. The zaidar, who called the bird *phairni*, said

they would have eggs in about twenty days' time. On the strength of this, as I hoped to procure specimens at the nest, I only shot one, a male with testes the size of lentils. The following day half a dozen birds were about and often rested on the rafters of the verandah. I examined likely nesting places in the adjacent nullahs but could find no signs. In fact the only time I came on a nest was on the remains of an old one halfway between Dhanni and Tithwal, elevation approximately 3,000 ft. At the Dhanni rest-house the eaves were also being used by these birds, and as far as the Tithwal gorge I noted them at times as we marched along. It was most disappointing therefore to find that they no longer occurred at Tithwal. 3,200 ft. seemed to be their limit.

On the journey down from Srinagar on June 12 I first noted one of these birds at the 37th mile from Kohalla. The elevation marked on the milestone was 2,800 ft. I saw them all the way to Kohalla, particularly about Domel, and even after we had left the Jhelum and climbed a thousand feet or so towards Murree I noticed odd birds. Two nests were also observed, one crumbling, the other new looking, on rocks overhanging the road near the 29th milestone.

(70) *Motacilla alboides*.—Pied Wagtails were very common in the lower reaches of the valley in April, both grey and black backed birds being noted in numbers feeding in ricefields and other wet patches. These birds were probably on passage. In May as we approached the upper reaches of the river I came to the conclusion that I was only observing Hodgson's Pied Wagtails which were then to be found in pairs at rather wide intervals. As I was particularly keen on collecting only those birds which I knew to be actually breeding, I collected no specimens as I found no nest, nor did I observe any birds even carrying building material.

(71) *Motacilla cinerea caspica*.—Grey Wagtails were very common throughout. Their vanguard is certainly early on to the breeding grounds at the lower elevations, and even in April intruders were very rapidly 'seen off' occupied territory. Nevertheless nesting activity was hardly noticed before the march from Janwai on May 17, during which I saw no fewer than three separate birds carrying building material.

(72) *Anthus roseatus*.—With the exception of a single bird seen in some cultivation on one of the first marches, which I failed to procure, I saw no Pipits until Kel was reached. Here was a stretch of very damp grazing ground on which Pipits abounded. Two obtained on May 13 proved to be females with the ovaries but slightly developed. Suitable grassy ground of the same description seven miles short of Taobat, at Taobat, Bagtor, and Gurais supported many of these same Pipits. The state of the organs of two males shot at Bagtor on May 27 showed that breeding was imminent. I also noted them at this place on much drier ground and even in newly-ploughed fields.

(73) *Alauda gulgula thamorum*.—Neither heard nor seen until we first passed through Bagtor on May 18. They were common there and in Gurais. I found them feeding in small flocks on the grassy margs and amongst new plough, but a male shot on May 27 had the testes greatly enlarged, while two females had a few yolks measuring an eighth of an inch in diameter.

(74) *Zosterops palpebrosa occidentis*.—Flocks were noted from Domel to Keran wherever there were groves of leafy trees or bushes. The last were seen feeding in viburnum and other low bushes on the Nilam plateau (5,400 ft.) a mile or so beyond Keran on May 5.

(75) *Leptocoma asiatica*.—Evidently not uncommon at Domel as I saw two pairs in the course of an evening stroll on April 17. One pair was also seen twice at Pateka on April 18 and 19 in some bushes at the edge of cultivation about a mile from the F.R.H.

(76) *Picus squamatus squamatus*.—The loud call of this species first attracted my attention on our arrival at Salkalla on April 25, where I found it to be somewhat common in the open mixed forest and around clearings. It was common at Keran and I also noted it at Sharda, but it was not seen after leaving the latter place.

(77) *Dryobates himalayensis albescens*.—This Woodpecker was not recorded until we reached the 5,000-foot level at Keran where it was somewhat common. From Keran onwards it was noted at every halt to Gurais, but was scarce in the thick spruce and fir forests. I have always noticed that this Woodpecker has an undoubted predilection for chestnut trees and where these occur five out of every six nest holes will be bored in them. The thick fir forests from Kel upwards, containing but few trees of other species, consequently held but a limited number of Woodpeckers.

(78) *Dryobates brunneifrons*.—While searching for *Dryobates macei* at Pateka, with which I never met incidentally, on April 20 I shot a male of this species with testes developing, approximately $\frac{1}{16}$ inch in length, which was searching the trunks of an open wood of long-leaved pines in company with its mate. On arrival in Srinagar on June 2, I was surprised to see a pair of these Woodpeckers in the Chenar Bagh on one of the poles carrying the electric mains. They were most amazingly tame.

(79) *lynx torquilla japonica*.—Shot one at Keran in mistake for another bird when it was feeding by the side of a small bush. Its stomach was filled with a large number of small red ants which accounts for its presence on the ground. It was a male with testes slightly enlarged. I observed this bird to be common at Kel, and also at Bagtor where I heard its call from three directions at the same time as we were passing through on May 18.

(80) *Cuculus canorus*.—Not common. It was first heard at Sharda between May 8 and 10, but only in the one locality. Near Kel on May 14 one flew across the path in front of us. At Bagtor up to the date of our departure I heard the call not infrequently from two directions. On crossing the Razdhainangan pass however and dropping into the Tragbal forest, it immediately became very common.

(81) *Cuculus optatus*.—Heard at Bagtor between May 20 and 29, but only occasionally. One appeared to have its territory in the forest around Izmarq between Bagtor and Kunzalwan, and another to the west of the forest rest-house.

(82) *Psittacula himalayana himalayana*.—Slaty-headed Paroquets were met with from the commencement of the trek and were last seen near Dudhnil at approximately 6,000 ft. on May 5. My wife aptly likened their screams when flying about in bands to the whistlings of marmots on a more subdued scale. A pair which seemed to have a nest behind the Keran bungalow, were also heard to produce some very pleasant soft notes, the screams being generally resorted to on the wing. A number of somewhat large elliptical holes with the axis horizontal, which I thought might have been made by this species, were noted at Keran and one or two other places about there, generally near the very summit of tall dead trunks standing in forest.

(83) *Ceryle lugubris guttulata*.—Nest holes of this fine bird were seen at the Ghori suspension bridge in the bank of the main river, where I was told the bird breeds regularly, near Mirpur, at Salkalla, and at Keran. At Salkalla on April 27 I surprised the birds during tunnelling operations. The hole they were boring was a yard from an abandoned hole three feet deep in the wall of a sandy recess on the inner side of the path where it runs close to the water's edge a mile below Salkalla. When first noted the previous day the new hole was under a foot deep, but in twenty hours another three and a half feet of sand had been excavated. Incidentally I saw no nest holes or birds on the side streams.

(84) *Alcedo atthis pallasi*.—I only saw a single bird and this in the Shalput nullah at Bagtor at 7,900 ft. on May 21.

(85) *Halcyon smyrnensis*.—Before the valley closed in a couple of miles from Muzaffarabad I saw two or three of these birds, but the deep gorge thence to Ghori seems to have effectively barred their further progress up the valley.

(86) *Upupa epops epops*.—Not common. Only noted at the following places:—
May 5. Keran. One seen on the Nilam plateau.
May 8. Sharda. One by the suspension bridge.

May 19 and 20. Gurais. One seen near Wampur village and another haunted the P.W.D. Inspection bungalow at Badwan.

These were all light-coloured birds with much white in the crest so presumably *epops*.

(87) *Micropus melba*.—I have already related how I came on a colony of these Swifts at the mouth of the Tithwal gorge, and failed to collect any specimens. Narrow crevices in the rock face each seemed to be occupied by a number of birds. Some of these crevices were horizontal, others almost vertical. Noisy bands visited the crevices at intervals of roughly quarter of an hour, but a certain number of birds evidently seldom or never left them, as twittering noises emanated from within at frequent intervals the whole time I was watching, and on occasions single birds flew out. I climbed up a small steep rocky spur as far as I could but failed to get near enough to see anything. A party was also seen at Salkalla and a few birds were with the Martins seen at Bagtor.

(88) *Micropus apus pekinensis*.—Although only definitely recognised at Pateka, Keran, and Kel, this Swift is almost certainly quite common throughout the valley. Swifts imperfectly seen flying at high altitudes at practically every stage were most probably of this species.

(89) *Micropus affinis*.—A party of Swifts flying about below me in a deep gorge five miles beyond Dhanni was attributed to this species.

(90) *Hirundapus caudacutus nudipes*.—A band of these birds was seen on a number of occasions flying over Keran. After an exhibition of their amazing speed the flight of the Eastern Swifts appeared slow and laboured.

(91) *Caprimulgus macronurus albonotatus*.—Presumably this species. On both sides of the Pateka F.R.H. are deep nullahs; one a mass of tumbled rocks and debris, the other harbouring a small stream with open woods of long-leaved pines on its precipitous flanks. Between them is a grassy spur with pines scattered about it. At dusk each night, sometimes from the spur and always from the direction of the nullahs, I heard the rapid tuck-tuck-tuck of Nightjars. The notes were rapidly repeated in series of varying length at the rate of the ticking of a clock. Soon after the calling started, fighting also began. Going out the moment I first heard them in the hopes of collecting specimens I was surprised to note no less than three birds at once high up in the air hawking insects like Swallows. Standing well up the spur not one came over me low enough for a shot, and over the nullahs they must have been some hundreds of feet up though as it grew darker one commenced to swoop down into the pines further above me. These aerobatics appeared to last about half an hour. The calling also ceased as soon as it was dark. On my way up the spur one calling bird flew out of a pine where it had evidently been sitting about ten or fifteen feet up. After failing to get specimens at Pateka I hoped to meet with them further on but no more were either seen or heard.

[Mr. Hugh Whistler, who has very kindly read through the draft of this paper and examined the few skins collected during the trip, has drawn my attention to the descriptions of Nightjars' calls given in his Survey of the Eastern Ghats (*J.B.N.H.S.*, vol. xxxviii, No. 1). To transfer bird-calls to paper is an almost impossible task and I am not quite convinced that the Pateka Nightjar was not *albonotatus*, but must admit that his suggestion that it was more likely *indicus* may be right. At 9-30 p.m. on May 20 I recorded in my diary 'There is now a new sound (from some distance up the stony nullah)—a double note followed by a lower more subdued one—poo-poo-tuck-poo-poo-tuck.']

(92) *Strix stuco biddulphi*.—This fine Owl was heard by the river at Badwan (Gurais) and a male was obtained at Bagtor on May 29 when it paid us a visit at dinner time. Osmaston's version of its call (*J.B.N.H.S.*, vol. xxxii, p. 140) does not seem to me quite correct. It struck me as being 'Hoo—interval—'Hoo'—shorter interval—'Hoo-ho-ho-hoo', the final 'hoo' being somewhat drawn out. In fact the notes are not unlike those of the Turtle-Dove. When picked up not quite dead, the bird I shot snapped its bill quite loudly a number of times. Its testes were not much enlarged, being about the size

of small peas. A bird was also disturbed by our dogs in thick fir forest above the Bagtor rest-house but it may have been the one I shot.

(93) *Ægyptius monachus*.—One of these magnificent Vultures was come upon perched on a deodar branch on the edge of the Nilam plateau at Keran on May 1. On our nearer approach he sailed off in the direction of some towering cliffs a mile up the valley.

(94) *Gyps himalayensis*.—Common throughout the valley.

(95) *Pseudogyps bengalensis*.—One was seen cruising over the confluence of the Kishenganga and Jhelum rivers at Domel on April 17 in company with some Himalayan Griffons.

(96) *Neophron percnopterus percnopterus*.—Seen occasionally as far as Doarian (5,000 ft.). I once saw one of these birds at Sekwas in the Lidar valley at an elevation of nearly 12,000 ft.

(97) *Gypaëtus barbatus grandis*.—Noted throughout the length and breadth of the valley. They seemed just as much at home sailing over the steep forest-clad hillsides as alongside towering cliffs in the gorges, although of course bare crags and rock-strewn slopes above the tree-line is the type of country most usually connected with this bird's habitat.

(98) *Falco subbuteo*.—One pair of Hobbies was noted over Keran on April 30. At Bagtor on May 29 I was hailed from my breakfast to deal with an obviously breeding Sparrow Hawk which had been carrying off Turtle-Doves from nearby. A Hobby had been taken for her by my servants and was sitting at the very summit of an exceedingly tall spruce fir. I managed to bring it down whereupon a second one, which I had not noticed, flew from the next tree emitting wild screams of anger. While skinning the bird procured, which was a female holding nine or ten yolks as much as one-eighth inch in diameter, a second bird, which I thought must be the male returned in search of her, flew into a pine not thirty yards off. As it sailed back towards the wood low over my head it paid the penalty for its temerity. To my surprise it was likewise a female with yolks developing, one being $\frac{3}{16}$ inch across.

(99) *Cerchneis tinnunculus*.—Kestrels, obviously breeding birds, were seen frequently whenever we passed suitable cliffs. At one point where the path took an abrupt bend over a rocky nullah and then on a wooden gallery up the face of a low cliff, I was able to look on to a sitting bird. Unfortunately some rock plants just prevented me from seeing whether there were eggs in the slight hollow in which the bird was seated. After watching for a couple of minutes its mate arrived whereupon both birds flew to a projecting rock where copulation immediately took place. This was on April 22 five miles from Dhanni at 2,900 ft.

(100) *Milvus migrans govinda*.—This Kite was seen as far as Dhanni.

(101) *Milvus lineatus*.—I came to the conclusion that all the Kites seen from Dhanni to Gurais were of this species. I saw no nests but they must breed in the Valley. I have a record of a nest containing young ones in June at 7,300 ft. in the Lidar valley.

(102) *Accipiter nisus*.—One was shot at Keran on May 5. Unfortunately its abdomen seemed to have received the full charge, and I found it impossible to tell whether it was a breeding bird or even to sex it. Another was seen on a number of occasions at Sharda between May 8 and 10. As it always returned up the forest whence it had come I did not shoot it hoping to trace a nest. In this I was unsuccessful. Again I came upon one at Bagtor which I saw fairly frequently, as its pet beat was the edge of the forest close to which the rest-house stands. On May 26 it killed a Turtle-Dove within a few yards of us, making a deep gash in its back. When we retreated it plucked the carcass most neatly and carried it off into the thick fir forest. Mounds of Dove feathers in two other places close by proclaimed the fact that other Turtle-Doves had met a similar fate very recently. Unfortunately



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Gyps himalayensis disposing of the body of a young buffalo.

R. S. P. Bates.

I had not got the gun with me, added to which she obviously had young ones to feed.

(103) *Columba livia neglecta*.—These Pigeons were not as common as I expected them to be. Flocks were certainly noted occupying suitable ledges and caves in the rocky banks in all the more gorge-like stretches of the river e.g. in the Tithwal gorge, but I never saw them out in the fields where such occurred except at and nearing Taobat where we disturbed two parties of three.

(104) *Streptopelia orientalis ferrago*.—The first one was seen five miles short of Salkalla on April 25 when we entered some rather thick secondary jungle consisting mostly of *Ilex*. Thereafter they gradually became commoner until at Taobat and Bagtor they were excessively so, roosting just within the fir forests and coming out particularly in the evenings to feed on the marga and in the cultivation.

(105) *Cerionis maculophus biddulphi*.—The crow of this Pheasant was heard a number of times during our short stay at Sharda, May 8 to 10, and again from the thick fir forest at river level three miles beyond that place on the march to Kel.

(106) *Alectoris graeca chukar*.—Common on the steep slopes running up to the Nilam plateau at Keran.

(107) *Tringa ochropus*.—One bird of this species was feeding in a flooded ricefield with a number of Pied Wagtails two miles beyond Pateka on April 22.

(108) *Tringa hypoleucos*.—These birds must move up to their breeding grounds very early. Single birds were seen near Salkalla on April 28 and five miles beyond Dudhnial on May 8, but on reaching the wider more placid stretches of the river halfway between Janwai and Taobat they at once became common. On May 18 shortly after leaving Taobat I came on a pair preparing a nest in some dock-leaves only four yards from the path but twenty from the river bank.

(109) *Phalacrocorax carbo sinensis*.—Noted as follows:—

April 17. A pair circling over the junction of the Kishenganga and Jhelum rivers at Domel.

April 23. A single bird flying downstream halfway up the Tithwal gorge.

April 24. A single bird flew downstream into the Tithwal gorge.

April 25. Before leaving Tithwal a bird was again seen flying into the gorge while a little later one flew upstream, possibly the same bird.

April 27. At Salkalla a Cormorant flew downstream.

May 1. At Keran (5,000 ft.) the last one was seen.

(110) *Ardea cinerea*.—On April 28 a single bird was observed perched on the summit of an isolated tall pine tree near the village of Danudra (4,670 ft.) between Salkalla and Keran. For a couple of miles just here the river is wider and less turbulent with a tree-covered large island almost opposite Danudra. I could see no signs of a Heronry.

THE MEDICINAL AND POISONOUS GRASSES OF INDIA.

BY

J. F. CAIUS, S.J., F.L.S.

The GRAMINEAE are one of the largest families of plants, including about 480 genera and 5,880 species. They are found in all climates and situations, but are most numerous in temperate regions.

The medicinal and poisonous grasses of the world belong to 78 genera:—AGROPYRON (temperate regions of Europe and Asia); AMPHILOPHIS (tropical Asia and Africa); ANATHERUM (Brazil); ANDROPOGON (tropics of both hemispheres; South Europe, North America, temperate Asia); ANTHEPHORA (Africa); ANTHOXANTHUM (temperate regions); ARISTIDA (all warm dry countries); ARTHRAXON (tropics and subtropics of the Old World); ARUNDINELLA (tropical Asia and America); ARUNDO (Mediterranean region; East Indies, Malay Archipelago, Central and South America, South Africa, Madagascar, New Zealand); AVENA (Mediterranean region; temperate region of the eastern hemisphere); BAMBUSA (Eastern Asia, Australia); BECKMANNIA (China); BRACHIARIA (both hemispheres, mostly African); BROMUS (temperate regions of northern hemisphere, South America); CENCHRUS (tropical and subtropical regions); CEPHALOSTACHYUM (North India, Malaya, Madagascar); CHLORIS (all parts of the world in tropical and subtropical regions); CHRYSOPOGON (Old World tropics, West Indies); COIX (East Indies, Ethiopia; warm regions); CROSSOTROPIS (Africa); CYMBOPOGON (Old World tropics); CYNODON (Australia, cosmopolitan); CYNOSURUS (Mediterranean region; Europe, Canaries); DACTYLOCTENIUM (Tropics); DENDROCALAMUS (South-eastern Asia); DESMOSTACHYA (India to Syria and North Africa); DIARRHENA (China); DIGITARIA (all warm countries); ECHINOCHELOA (warm regions of both hemispheres); ELEUSINE (all warm countries); ELIONURUS (tropical and subtropical regions of both hemispheres); ELYMUS (northern and southern temperate regions); ERAGROSTIS (all warm and temperate regions); ERIANTHUS (mainly tropical); FESTUCA (temperate regions); GLYCERIA (North America); GYNERIUM (South Brazil, Argentina); HETEROPOGON (tropical Africa and Asia to Mediterranean); HIEROCHLOA (temperate regions); HORDEUM (temperate regions; Europe, North Africa, Asia, North and South America); HYGRORRHIZA (India, Ceylon, Tongking); IMPERATA (tropical or warm regions of both hemispheres); LOLIUM (temperate regions; Europe, Asia, North Africa); LOPHATHERUM (Indo-Malaya, China, Japan); MANISURIS (tropical countries; India); MELICA (subtropical and temperate regions; Europe, Asia, Africa, America); MELINIS (Africa); MISCANTHIDIUM (tropical Africa south of the Equator, South Africa); NASTUS (Madagascar); OLYRA (Africa); ORYZA (tropical and subtropical regions of both hemispheres); ORYZOPSIS (northern hemisphere); OXYTENANTHERA (Africa, India, Malaya); PANICUM

(tropical and subtropical regions); PASPALUM (all warm regions); PENNISETUM (most warm dry regions; Africa); PHALARIS (Mediterranean region; South Africa, California to Chile); PHRAGMITES (almost the whole world); PHYLLOSTACHYS (Eastern Asia); POA (temperate regions); POGONARTHRIA (Africa); POLYTOCA (tropical Asia, Australia); SACCHARUM (tropical and subtropical regions of both hemispheres); SASA (China); SECALE (temperate regions); SETARIA (warm and temperate regions); SORGHUM (warm and temperate regions; Africa, India); SPOROBOLUS (tropical and subtropical regions of both hemispheres; America); STENOTAPHRUM (tropics of both worlds); STIPA (tropical and subtropical regions of both hemispheres); THELEPOGON (India to tropical Africa); THEMEDA (tropical and subtropical regions of the world); THYSANOLAENA (Indo-Malayan region); TRITICUM (Mediterranean region; temperate regions); VETIVERIA (tropics of the Old World); ZEA (all warm countries); ZIZANIA (North America, North-Eastern Asia).

The medicinal and poisonous grasses of India belong to 49 genera:—AGROPYRON, AMPHILOPHIS, ANTHOXANTHUM, ARISTIDA, ARTHRAXON, ARUNDINELLA, ARUNDO, AVENA, BAMBUSA, BROMUS, CENCHRUS, CEPHALOSTACHYUM, CHLORIS, CHRYSOPOGON, COIX, CYMBOPOGON, CYNODON, DACTYLOCTENIUM, DENDROCALAMUS, DESMOSTACHYA, ECHINOCHLOA, ELEUSINE, HETEROPOGON, HORDEUM, HYGRORHIZA, IMPERATA, LOLIUM, LOPHATHERUM, MANISURIS, ORYZA, OXYTENANTHERA, PANICUM, PASPALUM, PENNISETUM, PHALARIS, PHRAGMITES, PHYLLOSTACHYS, POLYTOCA, SACCHARUM, SETARIA, SORGHUM, STENOTAPHRUM, STIPA, THELEPOGON, THEMEDA, THYSANOLAENA, TRITICUM, VETIVERIA, ZEA.

- I. Spikelets spicate, all unisexual, male spikes in terminal panicles or continuous with the female spikes.
 - a. Fruiting spikelets enclosed in a strong nut-like polished bract COIX.
 - b. Fruiting spikelets having all the inner glumes concealed within the greatly enlarged hardened outer POLYTOCA.
 - c. Fruiting spikelets densely crowded on a cylindrical spongy rachis ZEA.
- II. Spikelets homo- or heterogamous, 1-2-flowered, solitary or 2- rarely 3-nate, on the internodes of an articulate spike or raceme.

Spikelets 2-nate; lower involucrel glume globose MANISURIS.
- III. Spikelets with a terminal perfect flower, and one or more imperfect male or neuter below it; rachilla not produced beyond the perfect flower.
 - a. Panicle contracted or spiciform; spikelets awnless PHALARIS.
 - b. Panicle spiciform; glumes 6, III and IV neuter, awned, stamens 2 ANTHOXANTHUM.
- IV. Spikelets paniced; rachilla not produced beyond glume III; floral glumes rigid or hard, awned.
 - a. Glume III narrow, awn 3-flowered ARISTIDA.
 - b. Glume III narrow, awn entire, grain terete STIPA.
- V. Spikelets homogamous, in compound racemes or panicles. Lower involucrel glume not sunk in a hollow of the rachis.
 - a. Rachis not fragile. Spikelets in a cylindrical silvery thyrsus IMPERATA.
 - b. Rachis fragile. Spikelets in a thyrsus of spiciform racemes SACCHARUM.

- VI. Spikelets many, in solitary digitate or fascicled spikes, usually heteromorphous. Lower involucrel glume not sunk in a hollow of the rachis. Margins of the lower involucrel glume of sessile spikelet not inflexed.
- a. Spikes 2-nate or digitate; spikelets 1-flowered ... ARTHRAXON.
 b. Spikes digitate; spikelets 2-flowered; glume I tubercled ... THELEPOGON.
- VII. Spikelets heterogamous, 1-flowered, 2-rarely 3-nate on the whorled articulate branches of simple or compound racemes or panicles.
- a. Spikelets in two superposed series; upper series of heterogamous pairs, and a terminal male, lower a whorl of 4 persistent males or neuters ... THEMEDA.
 b. Spikelets 2-nate, or the uppermost 3-nate, spicate or panicled.
- i. Sessile spikelets of all the pairs alike in sex and form throughout the spikes.
- ¶ Joints of rachis many, stout or slender, opaque VETIVERIA.
 ¶¶ Joints of rachis few; spikes articulate on the obliquely truncate bearded tips of the branches of the panicle ... CHRYSOPOGON.
 ¶¶¶ Joints of rachis very few, filiform, opaque; lodicules ciliate; grain dorsally compressed SORGHUM.
 ¶¶¶¶ Joints of rachis and pedicles of upper spikelets linear compressed with usually a central translucent channel and thickened margins ... AMPHILOPHIS.
- ii. Lowest one or more sessile spikelets differing from all those above it in sex or form.
- ¶ Spikes binate on the peduncle which is enclosed in a spathiform sheath; sessile spikelet dorsally compressed ... CYMBOPOGON.
 ¶¶ Spikes solitary, lower pairs of spikelets very unlike the upper; upper sessile spikelets cylindrical ... HETEROPOGON.
- VIII. Spikelets 2-flowered; upper flower bisexual, lower male or neuter, rarely both fertile.
- a. Spikelets dorsally flattened, base not thickened; glumes 3 with very rarely a minute 4th ... PASPALUM.
 b. Spikelets panicled or spicate; lower floral glume not beaked, upper floral glume crustaceous ... PANICUM.
 c. Spikelets innumerable, very minute, hairy, densely crowded in the capillary branches of a very large panicle ... THYSANOLAENA.
 d. Spikelets persistent on the pedicels, or glumes I and II separately deciduous, IV deciduous; usually awned, awn bent ... ARUNDINELLA.
 e. Glumes awned from the entire acute or acuminate tip or caudate or cuspidate-acuminate. Racemes dense, more or less secund ... ECHINOCLOA.
 f. Spikelets articulate on their pedicels, each surrounded by an involucrel of bristles ... SETARIA.
 g. Spikelets persistent on their pedicels, at least the fertile, or deciduous with their pedicels.
- i. Spikelets in involucrelled deciduous fascicles.
- ¶ Involucrel of bristles ... PENNISETUM.
 ¶¶ Involucrel of spines connate at the base ... CENCHRUS.
- ii. Spikelets not involucrelled, 2-seriate on a flat subarticulate rachis ... STENOTAPHRUM.

- IX. Spikelets 2- or more-flowered; rachilla produced.
Spikelets 2-6-flowered; flowering glumes awned; awn subterminal or dorsal ... AVENA.
- X. Spikelets panicled, 2-many-flowered; glumes very narrow, flowering glumes penicillate.
a. Rachilla elongate, glabrous; flowering glumes silkily hairy ... ARUNDO.
b. Rachilla very short; flowering glumes glabrous; callus with long silky hairs ... PHRAGMITES.
- XI. Spikelets 1-many-flowered, 1-2-seriate on the rachis of a simple spike or on the long slender branches of a simple panicle. Leaves broad, tessellately nerved. Spikelets 1-flowered, secund and articulate at the base; upper glumes empty, convolute with setiform tips ... LOPHATHERUM.
- XII. Spikelets usually panicled, 2- or more-flowered; floral glumes 5-many-nerved, upper empty or 0; styles short.
Spikelets panicled, 3-many-flowered; floral glumes mucronate or awned, dorsally rounded, 5-9-nerved, top of ovary lobed villous ... BROMUS.
- XIII. Inflorescence various; spikelets 2-many-flowered; flowering glumes 1-3-nerved, entire, 3-toothed, 3-lobed, or 3-awned. Floral glumes entire; acute or acuminate ... DESMOSTACHYA.
- XIV. Spikelets 1- or more-flowered, biseriate and secund on an inarticulate spike or on the spiciform branches of a slender panicle; flowers all or the lower only bisexual.
a. Spikes digitate, 1-flowered, upper imperfect flower absent ... CYNODON.
b. Spikes solitary, spicate or racemed; spikelets 2- or more-flowered, upper flower imperfect ... CHLORIS.
c. Spikes digitate or whorled; spikelets 3-6-flowered, densely crowded, awnless ... ELEUSINE.
d. Spikes terminating with a sharp point; upper involueral glume and floral glumes rigidly mucronate or shortly awned ... DACTYLOCTENIUM.
- XV. Spikelets 1-flowered, articulate on their pedicels and deciduous from them; palea 1-3-nerved, stamens 6 or fewer.
a. Spikelets bisexual, awned; glumes 2, narrow, thin ... HYGROBRIZA.
b. Spikelets bisexual, awned or not; glumes 4; I and II minute or setaceous ... ORYZA.
- XVI. Spikelets sessile, singly or in clusters; florets 1 or more.
a. Flowering glumes 5-9-nerved, lateral nerves not conniving; short or ending in teeth or awns ... TRITICUM.
b. Flowering glumes 5-7-nerved, lateral nerves conniving or confluent with the single terminal awn ... AGROPYRON.
c. Spikelets solitary at the nodes of the spike, 3-many-flowered; glumes coriaceous, lower involueral absent, except in the terminal spikelet; floral glumes 5-many-nerved ... LOLIUM.
d. Spikelets in groups of 3 at the nodes of a dense spike; floral glumes 5-nerved ... HORDEUM.
- XVII. Shrubby or arborescent grasses. Leaves flat jointed on the sheath.
a. Pericarp thin, adnate to the seed.
i. Stamens 3; spikelets 1-4-flowered, spicate; empty glumes 2-3 ... PHYLLOSTACHYS.

- | | | | |
|---|-----|-----|-----------------|
| ii. Stamens 6; filaments free; paleas entire or slightly cleft, all 2-keeled | ... | .. | BAMBUSA. |
| iii. Stamens 6; filaments connate. Spikelets few-flowered, palea of upper flower absent or glume-like, not keeled | ... | ... | OXYTENANTHERA. |
| b. Pericarp crustaceous; seed free; spikelets 2-many-flowered; palea 2-keeled, lodicules none; ovary hirsute at the top | ... | ... | DENDROCALAMUS. |
| c. Fruit oblong, beaked, pericarp thick, separable. Spikelets 1-flowered, bracteate, crowded in globose heads | ... | ... | CEPHALOSTACHYUM |

AGROPYRON.

This genus numbers 45 species, inhabiting mainly the temperate region of Europe and Asia.

Agropyron repens Beauv. (= *Triticum repens* Linn.) is found in Kashmir and Western Tibet, ascending up to 14,000 ft. in the Karakoram Range. This grass is a native of Europe, where it is found freely in road-sides, fields and waste places. The commercial supplies come largely from England and Germany. The plant now abounds in meadows and cultivated grounds in the northern United States of America, where it is often very troublesome as a weed. 'This grows in gardens and arable lands, as an infirmity or plague of the fields, nothing pleasing to husbandmen; for after the field is plowed, they are constrained to gather the roots together with harrowes and rakes, and being so gathered and laid upon heaps, they set them on fire lest they should grow againe.'

'Although that Couch-grasse be an unwelcome guest to fields and gardens, yet his physicke vertues do recompense those hurts. Couch-grasse healeth green wounds.'

The plant has been employed in England from remote times as a vulnerary, and to remove difficulties of urination. 'Being boiled and drunk it openeth obstructions of the liver and gall, and the stoppings of urine, and easeth the griping pains of the belly, and inflammations; wasteth the matter of the stone in the bladder, and the ulcers thereof also. The seed doth more powerfully expel urine and stayeth laxes and vomiting. The distilled water alone, or with a little worm-seed, killeth the worms in children.

'The way of use is to bruise the roots, and having well boiled them in white wine, drink the decoction; it is opening, but not purging, very safe; 'tis a remedy against all diseases coming of stopping, and such are half those that are incident to the body of man; and although a gardener be of another opinion, yet a physician holds an acre of them to be worth five acres of carrots twice told over.'

In modern days an infusion of the root is generally regarded as a soothing diuretic, helpful to the bladder and kidneys. Formerly, this was a popular drink to purify the blood in spring. The decoction may be made from the whole fresh plant, or from the dried root sliced, two to four ounces being put in a quart of water, reduced to a pint by boiling. A wineglassful of this may

be given for a dose. It certainly palliates irritation of the urinary passages, and helps to relieve against gravel. A liquid extract is also dispensed by the druggists, of which one or two teaspoonfuls are given in water.

In Europe the decoction is used to a considerable extent as a diluent and slightly nutritious drink. The French specially value it for its stimulating fragrance of vanilla and rose perfumes.

The rhizome is officinal in the pharmacopeias of France, Switzerland and Turkey. It is diuretic, demulcent and aperient. It exerts an influence upon the genito-urinary organs, and it is used internally as a demulcent drink for irritable bladder, and also for cystitis. It is one of the least stimulant of the remedies of its class, and may be employed very freely. It is also recommended in gout and rheumatism.

The rhizome contains grape sugar, fruit sugar, a sugar of undetermined identity, gum and inosite. It is also said to contain glucosides, one of which yields vanillin on hydrolysis, also a carbohydrate resembling inulin which has been named *triticin*.

Brahui: Milinj—; *Catalan*: Agram, Gram—; *Chinese*: Se Mao Ts'ao—; *Dutch*: Kweek—; *English*: Couch Grass, Dog Grass, Quack-grass, Quick Grass, Quilch, Twitch Grass, Witch Grass—; *French*: Agram, Agropyre rampant, Auge, Blé sauvage, Chiendent, Chiendent des boutiques, Chiendent officinal, Chiendent ordinaire, Froment rampant, Herbe à deux bouts, Laitue de chien, Petit chien-dent, Sainte neige, Tranuge, Vagon, Wagon—; *German*: Ackergras, Ackermannswurzel, Bagenwurzel, Fadenwurzel, Fegwurzel, Flechtgras, Graswurzel, Haarstrang, Hundsgaswurzel, Hundsruecken, Knotengras, Kriechweizen, Land-dreck, Paeden, Peden, Peyer, Poeden, Queck, Rebel, Ribel, Schnur, Schweinegras, Schnengras, Spulwurzel, Tuerkisches Gras, Weisswurz, Wreeten, Wuemgras, Wurmgras, Zweckenwurzel—; *Greek*: Agrostis—; *Italian*: Caprinella, Dente canino, Graminga, Granacina—; *Polish*: Perz—; *Portuguese*: Grama—; *Provence*: Gram—; *Roumanian*: Albeiu, Iarba caineasca, Pir—; *Russian*: Eja, Pirei, Porei—; *South Africa*: Couch Grass, Dog Grass, Triticum—; *Spanish*: Grama, Grama de las boticas—; *Swedish*: Quick hwete—; *Tasmania*: Couch—; *Turkish*: Ayrikotu—.

AMPHILOPHIS.

This genus consists of 25 species or more, distributed throughout tropical Africa and Asia, many of them closely allied and difficult to differentiate.

Amphilophis odorata A. Camus (= *Andropogon odoratus* Dna. Lisboa) is found in the Deccan, where it is considered carminative.

Bombay: Ushadhana—.

ANTHOXANTHUM.

The genus includes 4 or 5 species, natives of Europe and temperate Asia; one being found also in North America and Australia.

Anthoxanthum odoratum Linn. is a native of Europe and Central and Northern Asia occasionally found in the hill districts of India, but only as introduced by man or as an escape from cultivation. It is found in North Africa and the Atlantic Islands. Naturalised in North America it occurs as a meadow grass in pastures from Washington to California.

This grass is specially provocative of hay fever and hay asthma with persons liable to suffer from these distressing ailments. Accordingly a medicinal tincture is made from it with spirit of wine, and if some of the same is poured into the open hand-palms for the volatile aroma to be sniffed well into the nose and throat, immediate relief is afforded during an attack. At the same time three or four drops of the tincture should be taken as a dose with water, and repeated at intervals of twenty or thirty minutes, as needed.

The flowers contain *coumarin*, and their volatile pollen impregnates the atmosphere in early summer. But, strange to say, while the plants growing in spring have a delightfully characteristic odour and a pleasant aroma, those flowers which appear late in autumn emit a most nauseating odour.

English: Pig Grass, Sweet-scented Grass, Sweet-scented Spring Grass, Sweet-scented Vernal Grass, Sweet Vernal Grass—; *French*: Flouve odorante—; *German*: Ruchgras—; *Italian*: Palcino odoroso, Palco—; *Uruguay*: Grama de olor—.

ARISTIDA.

It is assumed that this genus includes about 300 species, natives of warm countries.

Aristida adscensionis Linn. is found throughout the plains and low hills of India, Burma and Ceylon, ascending to 8,000 ft. in Kashmir; it is distributed over most warm countries.

In Madagascar an ointment consisting of lard and the ashes of the flowers is used topically for itch and ringworm.

Hova: Horombavy, Pepaka—; *Southern Nigeria*: Oka olongo—.

ARTHRAOXON.

The genus consists of 20 species distributed throughout the tropics and subtropics of the Old World.

Arthraxon ciliaris Beauv. is found in the hilly districts of India from Kashmir eastwards to Burma, ascending the Himalaya to 5,500 ft., and southwards to the Nilgiri Hills and Ceylon. It extends to southern and central China, and Shantung.

The plant is used medicinally in various parts of China.

Bombay: Turade, Turde—; *Chinese*: Chin Ts'ao—.

ARUNDINELLA.

This genus consists of about 55 species, found mainly in Tropical Asia and America.

Arundinella brasiliensis Raddi occurs throughout the hilly parts of India, from the Himalaya, ascending to 7,000 ft., to Burma and Ceylon. It is distributed to China, Malaya, Australia, South Africa, South Europe, tropical America.

The natives of Basutoland use the plant in compounding many medicines and in making a lotion for washing wounds.

Bombay: Dundi, Kotir—; *Suto*: Mahlakamane—.

ARUNDO.

This genus includes 12 species, natives of the Mediterranean region, and distributed to the East Indies and the Malay Archipelago, Madagascar, New Zealand, Central and South America.

Arundo donax Linn. is found in the Lower Himalaya from Kashmir to Nepal, ascending to 3,500 ft., from the Punjab to Sylhet, the Naga Hills up to 5,000-8,000 ft., Burma, the Circars, Coorg, the Nilgiri Hills. It extends westwards to Europe, North Africa and North Asia.

The rhizomes are much used in decoction as an emollient and diuretic. They are said to stimulate the menstrual discharge and diminish the secretion of milk.

Catalan: Canya—; *Egypt*: Busfarisk, Bus haggai, Buz haggi, Ghab, Gub-rumy, Gasab—; *English*: Common Reed, Giant Reed, Great Reed, Reed, Spanish Cane—; *French*: Canne de Provence, Donax, Grand roseau—; *Greek*: Kupho Kalamo—; *Indo-China*: Cong, Cuoi, Dich lo chuc—; *Italian*: Canna—; *Maltese*: Kasba—; *Portuguese*: Canna—; *Spanish*: Caña comun—; *Sokoto*: Gabara, Machara, Wutsiyar giwa—; *Yemen*: Kassab—.

AVENA.

This genus numbers about 55 species found chiefly in temperate regions.

A. fatua Linn., *A. sativa* Linn., *A. sativa* var. *orientalis* Hook. f. are used medicinally in Europe; *A. fatua* Linn. is also used in China.

1. Ligule short, very obtuse, up to 3 mm. long ... *A. fatua*.
2. Ligule truncate, 1-3 mm. long *A. sativa*.

1. **Avena fatua** Linn. is found in the Punjab, North-Western Himalaya, and Western Tibet, in cultivated fields, ascending to 9,000 ft.; also in Sikkim Himalaya up to 9,000 ft. It is distributed to temperate Europe, Northern Africa and Northern Asia.

In Europe the seeds are used for their emollient, refrigerant, and diuretic properties.

In the Punjab the seed is believed to produce poisonous and deleterious effects.

Arabic: Bakhragan, Basheruk, Ghallash sheytany, Khafur, Shair-el-ghul, Sabus esabbaras, Zommeyr—; *Catalan*: Cugula—; *Chinese*: Ch'iao Mai—; *Egypt*: Chafur, Sammeir—; *English*: Drake, Wild Oat—; *French*: Avéneron, Averon, Avoine bouffe, Avron, Coquiolle, Couyonne, Folle avoine, Pied de mouche—; *German*: Windhafer—; *Greek*: Agrio genima—; *Hindi*: Gandal, Ganer, Jei, Kuljud—; *Iraq*: Dosar, Shofan, Sunaislah—; *Italian*: Lippa—; *Jhalawan*: Gandamkao—; *Kurdish*: Gia brishi, Kaltas—; *Languedoc*: Coughi-oulo—; *Mosul*: Hurtuman—; *Punjab*: Ganerjei, Gozang, Kasamm, Upwa, Yupo—; *Roumanian*: Odos—; *Russian*: Jivoi ovios—; *Spanish*: Avena loca, Cula—; *Turkish*: Chodar—.

2. **Avena sativa** Linn. is cultivated in Northern India, from Bengal to the Indus; and in the Himalaya up to 12,000 ft. It was known to the ancients, and is now cultivated in all civilized countries; but its original locality has not been satisfactorily ascertained. It grows wild in Sicily, and is said to have been seen in the Island of Juan Fernandez, off the Coast of Chili.

'Common Otes put into a linnen bag, with a little bay salt quilted handsomely for the same purpose, and made hot in a frying pan, and applied very hot, easeth the pain in the side called the stitch.' Oats fried with bay salt, and applied to the sides, take away the pains of stitches and wind in the sides of the belly.

'A poultice made of the meal of oats, and some oil of bays added, helps the itch and leprosy; as also the fistulas of the fundament, and dissolves hard imposthumes.' A yeast poultice made by stirring oatmeal into the grounds of strong beer is a capital cleansing and healing application to languid sloughing sores.

The meal of oats boiled with vinegar and applied, takes away freckles and spots in the face, and other parts of the body. 'Ote-meale is good for to make a faire and wel-coloured maid to look like a cake of tallow, especially if she take next her stomacke a good draught of strong vinegre after it.'

As a food oatmeal is apt to undergo some fermentation in the stomach, and to provoke sour eructations. Furthermore, it is somewhat laxative, because containing a certain proportion of bran which mechanically stimulates the intestinal membranes; and this insoluble bran is rather apt to accumulate.

American doctors have taken of late to extol the Oat when made into a strong medicinal tincture with spirit of wine, as a remarkable nervine stimulant and restorative: this being especially valuable in all cases where there is a deficiency of nervous power, for instance, among over-worked lawyers, public speakers, and writers.

The tincture is ordered to be given in a dose from ten to twenty drops, once or twice during the day, in hot water, to act speedily; and a somewhat increased dose in cold water at bedtime so as to produce its beneficial effects more slowly then. It proves an admirable remedy in nervous prostration and exhaustion after all febrile diseases, and in sleeplessness from nervous exhaustion. It seems to exert a very beneficial action upon the heart muscles and on the urinary organs, speedily relieving spasmodic conditions of bladder and ureter.

Catalan: Sibada—; *Dutch*: Haver—; *English*: Groats, Haws, Oat, Oats—; *French*: Avoine, Avoine cultivée, Avoine noire—; *German*: Haber, Hsfer—; *Greek*: Bromi—; *Hindustani*: Jai—; *Hova*: Varintsocavahy—; *Hungarian*: Zub—; *Italian*: Avena, Vena—; *Languedoc*: Arracho, Aveino, Civada, Civado, Sibado—; *Malta*: Oats, Avena, Hafur—; *Polish*: Owies—; *Portuguesq*: Avena—; *Punjabi*: Javi—; *Roumanian*: Oves—; *Russian*: Ovios—; *Spanish*: Avena—.

Avena sativa var. orientalis Hook. fil. is characterised by the presence of bristly hairs at the base of glume III. It is found in North-Western India, the Soane Valley, and Murshidabad.

The seeds are used in Spain as an emollient, refrigerant, and diuretic.

BAMBUSA.

This genus consists of about 73 species, occurring in Eastern Asia, Malaya, and one in Australia.

B. arundinacea Retz. is used medicinally in Guiana, *B. barbata* Trin. in Madagascar, *B. vulgaris* Schrad. in Indo-China.

B. blumeana Schult. is used as a poison in Malaya.

- I. Arborescent or shrubby. Stems not spinous ... 1. *B. vulgaris*.
- II. Arborescent. Stems spinous.
- a. Stem-sheaths long blade with felted hairs within. Empty glumes 0-2 ovate lanceolate acute or mucronate, many-nerved ... 2. *B. arundinacea*.
- b. Stem-sheaths short. Empty glumes 2-3 ovate acute, 3-7 nerved ... 3. *B. blumeana*.

1. ***Bambusa vulgaris*** Schrad. is cultivated throughout tropical India and in all hot countries.

The roots, the shoots, the bark and the leaves are all used medicinally in Indo-China.

The roots and the shoots are considered emollient, diuretic, diaphoretic; they are used to purify the blood, and they are commonly administered for obstruction, retention of urine, indefinite pain and syphilis. Mixed with equal parts of tobacco and betel leaves, the fresh root is macerated in oil and applied externally to hard tumours and in cirrhoses.

The astringent bark is used in haemorrhage, excessive menstruation, nausea and vomiting.

The leaves are cooling and emollient; a decoction is given in fevers, melancholia, cough and sore throat.

In Cambodia the nodes are considered bechic, astringent, tonic and depurant; they are prescribed in bronchitis, blennorrhagia, leucorrhoea, metrorrhagia and the yaws.

Bengal: Basini bans—; *Bombay*: Kallak, Vansa kalaka—; *Cambodia*: Asey, Russey—; *English*: Yellow and Green Striped Bamboo—; *French*: Bambou des jardins—; *Indo-China*: Long dau chuc, Tam vong, Tre tau, Tre vuon—; *Malay*: Buluh minyak has, Buluh pan—; *Sinhalese*: Una—.

2. ***Bambusa arundinacea*** Retz. is found throughout the plains and low hills of India, Burma and Ceylon, wild and cultivated. It is cultivated in the lower Himalaya and in the valleys of the Ganges and Indus.

The hollow stems of this bamboo often contain a silicious and crystalline substance known in the bazaars of India as *tabashir*. This is largely used by Hindus and Mahomedans who prize it very highly as a stimulant and aphrodisiac. It is a demulcent, tonic, aphrodisiac and pectoral, which has been found useful in cough, consumption, asthma and fever. In combination with other astringent medicines it is given in chronic dysentery and internal haemorrhages.

The most efficacious application for dislodgement of worms in ulcers is a poultice made by pounding the young shoots of the bamboo. The juice is first poured on the vermin, and the ligneous mass is applied and secured by a bandage.

Yunani practitioners consider the root a good tonic; they apply the ash to ringworm, bleeding gums and pains in the joints. In the Tamil country the root is considered diluent, the bark is used as a cure for eruptions, the leaves are given to stimulate the

menstrual flow, and the tabashir is prescribed in paralysis and for flatulence.

A belief in the emmenagogue properties of the leaves is common alike in India and in China. A decoction of the leaf-bud is said to be very effective. The juice of the leaves with aromatics is given in blood vomiting. With black pepper and common salt the leaves are used to check diarrhoea in cattle.

The juice of the flower is dropped in the ear for earache, and in deafness.

A decoction of the joints is supposed to have an action on the uterus, and is used by females after delivery to cause a free flow of the lochial discharge. The same part of the plant pounded with water is applied to inflamed joints.

The Ayurvedists describe the seeds as acrid, sweet, aphrodisiac and fattening. They use them freely in biliousness, urinary discharges and all forms of poisoning.

Mhaskar and Caius have shown experimentally that the bark, the seeds and the tabashir are equally useless in the antidotal treatment of either snake bite or scorpion sting.

Annam: Tre, Tre phee—; *Arabic*: Qasab—; *Assam*: Bnah, Kata, Koto—; *Bengal*: Bans, Bansh, Behurbans, Kautabans, Ketua—; *Bombay*: Dongi, Kalak, Mandgay, Padhai—; *Burma*: Kyakatwa—; *Canarese*: Bambu, Bidaru, Bidiru, Bidirumale, Bidru, Bidungalu, Bidungulu, Biduru, Dongi, Elubidiru, Gale, Hebbiduru, Hebbidru, Hennubiduru, Kalale, Karira—; *Cantonese*: T'in Chuk Wan, T'in Chuk Wong—; *Catalan*: Bambu—; *Central Provinces*: Kattang—; *Chinese*: T'ien Chu Huang, T'ien Chu Yuen—; *Chittagong*: Bariala—; *Deccan*: Bambu, Bhans, Chansa—; *English*: Spiny Bamboo, Thorny Bamboo—; *French*: Bambou, Bambou commun, Canne bambou—; *French Guiana*: Bambou—; *Garro*: Whahkanteh—; *German*: Bambus—; *Gond*: Katiwador—; *Gujerati*: Toncor, Wans—; *Haldwani*: Kanwas—; *Hasada*: Katangarimad—; *Hindi*: Bans, Kantabans, Kattang, Magarbans, Malbans—; *Italian*: Bambu, Canna indiana—; *Java*: Singkara—; *Kadir*: Mula, Mulai—; *Kolami*: Katamadh, Katanga—; *Konkan*: Kalak, Padhai—; *Konkani*: Conoqui, Kanaki, Vellu—; *Korku*: Mad—; *Kumaon*: Kanta bans—; *Lambadi*: Bambu—; *Lao*: Mai pai—; *Madras*: Ponteveduru—; *Magahi*: Wanah—; *Malaya*: Thian chook wong—; *Malayalam*: Illi, Kampu, Kaniyaram, Karmaram, Mula, Mulmulam, Pattil, Tejanam, Trinadhvajam, Valiyamula, Venu—; *Marathi*: Kallak—; *Mundari*: Katanggamad, Katanggarind—; *Naguri*: Katangmad—; *Panch Mahals*: Vas—; *Persian*: Nai—; *Portuguese*: Bambu espinhoso, Spodio—; *Provence*: Boulou—; *Punjab*: Magae, Nal—; *Roumanian*: Bambu—; *Russian*: Bambuk—; *Sanskrit*: Bahupallava, Brihattrina, Dhanurdrama, Dhatushya, Dridhagranthi, Dridhakanda, Dridhapatra, Duraruba, Kamatha, Kantaki, Kantali, Kantalu, Karmmara, Kichaka, Kilati, Kishkuparva, Kugshirandhra, Mahabala, Maskara, Mrityubija, Navagragandha, Phalantaka, Purvayoni, Pushpaghataka, Shataparva, Shatpadalaya, Suparva, Suparvan, Tajana, Tejana, Trinadhvajam, Trinaketu, Trinaketuka, Trachisara, Tvakasara, Vadaniya, Vansha, Vanya, Venu, Yavaphala—; *Santali*: Mat—; *Sinhalese*: Kattuuna, Una—; *Spanish*: Bambu, Caña de Indias para bastones, Mambú—; *Tagalog*: Canayangtotoo—; *Tamil*: Ambal, Ambu, Aril, Bongu, Iraivarai, Kalai, Kambu kilai, Kisagam, Kulaimungil, Masukkaram, Mirittusam, Mudangal, Mulai, Mullumungil, Mundaveduru, Mundul, Mungil, Nadinungil, Nedil, Netti, Palandam, Panai, Pandil, Pasy, Periamungil, Perumungil, Peruvurai, Sabam, Sanagi, Sey, Tandu, Tattai, Tulai, Tumbu, Valsi, Vannigaruppam, Varaimungil, Vedit, Velam, Venu, Veral, Vey, Veyal, Vindil—; *Telugu*: Bongu, Bongudu, Bonguveduru, Kichakamu, Maskaramu, Mullaveduru, Mudusaveduru, Pentiveduru, Trinadhvajamu, Veduru—; *Thana*: Kalak, Katestokar, Padai—; *Tongking*: Tre gai—; *Tulu*: Bedru—; *Upper Godavery*: Kanka—; *Urdu*: Bansa—; *Uriya*: Bendobaunso, Kontabanso, Kontabaunso—; *Uruguay*: Bambú, Caña.

3. **Bambusa blumeana** Schult. is indigenous, and also cultivated to some extent, in the open sandy country of the Malay Peninsula, at Pekan in Pahang, at Perlis and Kanga in Kedah. It extends to the Malay Islands.

The very fine hairs found on the sheath leaves of the young sprouts are prominent among Malay poisons. They are used either alone or in combination with other things.

Malay: Buloh duri, Buluh dari—.

BROMUS.

This genus numbers about 40 species, found mostly in the temperate regions of the Northern hemisphere and of South America, several in the high mountains of the tropics.

B. catharticus Vahl., a Peruvian plant, is said to be purgative, and *B. purgans* Linn. of Canada is reputed emetic.

Bromus mollis Linn. is found in North-West India, Europe, the Mediterranean region as far as Persia, Western Siberia, Japan and the Atlantic Islands. It is naturalised in North and South America.

The grains of this plant bring on giddiness in man and the quadrupeds, and are fatal to poultry.

English: Bull-grass, Goose-corn—; *Italian:* Spigolina—; *Maltese:* Hortan, Hurtan—.

CENCHRUS.

This genus consists of about 25 species, found in the warm regions of both hemispheres, and in temperate North America.

Cenchrus catharticus Del. occurs in the Punjab and in the Upper Gangetic Plain. It is found in Perim Island, at the mouth of the Narbada River, and is distributed over Arabia, and tropical Africa.

In La Reunion a decoction of the fruits is taken as a diuretic and pectoral.

Bombay: Baront, Kukar—; *Hausa:* Karangiya—; *La Reunion:* Gratte-cul, Pagode—; *Rajputana:* Bharut—; *Sudan:* Cram-cram, Heskaniit—.

CEPHALOSTACHYUM.

This genus numbers 8 species inhabiting North India, Malaya and Madagascar.

Cephalostachyum capitatum Munro is found in the Sikkim and Bhutan Himalaya at 2,000-8,000 ft., and also in the Kasia, Jaintea and Naga Hills.

The leaves are much used medicinally in Madagascar. The infusion, 60 leaves for a litre of water, is given as tonic, anthelmintic, stomachic and carminative. An ointment consisting of 20 parts of ash and 30 parts of lard or suet is applied for the itch and for rheumatism.

Betsimisaraka: Volozatsy, Volozevona—; *Lepcha:* Pa-yang, Pa-yong—; *Madagascar:* Volo, Volotsangana—.

CHLORIS.

This genus contains 75 species found in the tropical and sub-tropical regions of both hemispheres.

C. petraea Thunb. yields hydrocyanic acid.

Chloris virgata Sw. is found abundantly in Rajputana, Upper and Lower Gangetic Plains, southwards to Bihar, Central and Southern India, Burma, Western Tibet. It extends westwards to Algeria, and is distributed over China, Mongolia, Tropical and South Africa and America.

A decoction of the plant or of its roots is used by the Xosas of South Africa as an addition to baths for the treatment of colds and rheumatism.

Rajputana: Gharaniagas—; *Nigeria*: Kafar gauraka, Kafar fakar, Sawun gauraka—; *Telugu*: Uppugaddi—; *Transaal*: Sweet Grass, Zoet Grass—; *Xosa*: uMadolwana—.

CHRYSOPOGON.

This genus consists of about 18 species found in the hot parts of the Old World, a few extending into the temperate zones; one in Florida and Cuba.

Chrysopogon serrulatus Trin. occurs in the Western Himalaya, from Kashmir to Nepal, ascending to 6,000 ft. It is found in the hilly districts from the Punjab to Bihar and Orissa, Burma and southwards to Ceylon. It extends to Indo-China, Afghanistan, Portuguese East Africa, Madagascar, Rhodesia and South Africa.

The plant is said to yield hydrocyanic acid. The seeds are a popular vermifuge in Annam.

Annam: Bong co, Co may, Co mu, Nam hoang lien—; *Indo-China*: Chien-dent grenille—; *Jhalawan*: Kaj—; *Kharan*: Kohigayab—; *Kila Saifulla*: Sabba—; *Nushki*: Kuj—; *Pab*: Kaj—; *Quetta*: Kohigayab—.

COIX.

The genus includes 5 or 6 species, natives of the East Indies and Ethiopia, one being broadly dispersed in warm regions.

Coix lachryma-jobi Linn. is found throughout the hotter and damper parts of India and Ceylon, wild and cultivated—not wild in Ceylon. It is distributed over tropical Asia, and is cultivated in Africa and America.

Yunani doctors use the seed as a tonic and diuretic. In Western practice the seeds are given as a tincture or decoction in catarrhal affections of the air passages and in inflammation of the urinary passages. In Tongking they are considered a good blood purifier and an excellent diuretic.

The kernels deprived of their shells are used as a food and medicine throughout China, Malaya, Indo-China, the Philippine Islands, and in La Reunion. They make an excellent diet drink for invalids, and have diuretic and cathartic properties. They are also employed for lung and chest complaints.

Among the Santals the root is given in strangury and in the menstrual complaint known as 'silka'.

An infusion of the parched and ground grains is used instead of tea by the Japanese. The Chinese consider the toasted seeds to be tonic and diuretic; they prescribe them in blennorrhagia.

The root is one of the ingredients in Vagbhata's snake remedy Ashtanga-agada; but Mbaskar and Caius have shown experimentally that the drug is not an antidote to snake venom.

Arabic: Damudud—; *Ashanti:* Akrokosaibia—; *Assam:* Koamonee, Sohriu—; *Balaghat:* Gurlu—; *Bengal:* Gurgur, Jilgurgur, Julgurgur, Kunch—; *Bombay:* Gurgur, Kardia, Kassaibija, Kassar, Keruch, Ranjondhla, Ranmaka—; *Bundelkhand:* Ganddula, Garun—; *Burma:* Cheik, Kalithi, Kyeikphun, Kyeit, Sakeik—; *Cachar:* Jhonki—; *Central Provinces:* Galbi, Ganddula, Kasei—; *Sakyeik—; Cachar:* Jhonki—; *Chinese:* I I Jen, Kiai Li, T'u I Mi, Y I Mi—; *Cutch:* Dhamra—; *Egypt:* Dimma ayub—; *English:* Christ's Tears, Job's Tears—; *Fiji:* Sila—; *French:* Larme de Job, Larmillé des Indes—; *Gond:* Kasai—; *Gujerati:* Kasai, Ranzondlo—; *Hindi:* Baru, Dabhir, Ganduta, Garahada, Gargaridhan, Garan, Gulbigadi, Gurlu, Jilgurgur, Julgurgur, Kaiya, Kansh, Kasei, Sanklu, Sankhru, Sankru—; *Igorotte:* Agda—; *Indo-China:* Bo ho hoang, Cuom gao, Neang vong, Y di—; *Jaintia Hills:* Sohriu—; *Japan:* Judsudama, Tomugi—; *Karen:* Be, Bema—; *Khasia Hills:* Sohriu, U sohriew—; *Konkani:* Ranzondlo, Ranzonnalo—; *La Reunion:* Job—; *Lepcha:* Kun-dap, Tung-lin—; *Lushai Hills:* Mim—; *Malay:* Jilai batu, Mulai tikus, Ringuiringui—; *Malaya:* Yee mai, Yee yin—; *Malta:* Dmuh ta Giobb, Hara tac Ciaul, Job's Tears, Lacrima di Giobbe, Zibeg tal curum—; *Manipur:* Changmimkhombi, Mim, Mung—; *Marathi:* Ranjondhala, Ranmakkai—; *Matheran:* Kasai, Ranmaka—; *Mexico:* Acayacoyotl—; *Mount Abu:* Dabhir—; *Mundari:* Bakrihoreng, Horeng, Loconghoreng—; *Naga Hills:* Kasi, Kesi, Koasangti, Kudhati, Kudhiathia, Sikrakravu, Sotsa—; *New Caledonia:* E'Houa—; *North-West Provinces:* Sankru—; *Philippines:* Alimodias—; *Poona:* Jondhali—; *Porto Rico:* Camandula—; *Portuguese:* Lagrimas de Job—; *Punjab:* Sanklu—; *Rajputana:* Dabhir—; *Ranchi:* Danghir—; *Sabathu Hills:* Sanklu—; *Saharanpur:* Baru—; *Samoa:* Maniusniu, Samasama—; *Sanskrit:* Gaberu, Gavedhu, Gavedhuka, Gavedu, Gojivha, Gundraguttha, Jargadi, Kshudra, Kunta—; *Santali:* Jargadi—; *Sema:* Akiti—; *Seoni:* Galu—; *Sierra Leone:* Boukon, Boukori, Ewaruwura, Kali bugi—; *Sinhalese:* Karibu, Kikirindi, Kikirindimana, Kukurindi—; *Spanish:* Lagrimas de San Pedro—; *Tagalog:* Tegbe, Tigbi—; *Tamil:* Kattu-kundamani—; *Twi:* Owu-ammang-mankang-m'asaim—; *Uruguay:* Lagrima de Cristo, Lagrima de Job, Lagrima de Maria—; *Visayan:* Adlay—.

CYMOPOGON.

This genus consists of about 36 species distributed throughout the tropical, and more rarely the subtropical, regions of the Old World.

C. winterianus Jowitt is officinal in Germany.

C. schoenanthus Spreng. is used medicinally in China, Guinea, Madagascar and Guiana; *C. nardus* Linn. in Cambodia, Guinea and Madagascar; *C. citratus* Stapf. in the Gold Coast; *C. exarvatus* Stapf., *C. marginatus* Stapf., *C. validus* Stapf. in South Africa.

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|--|-----|-----------------------------|
| A. Basal leaf-sheaths ultimately loosened and curled; blades flat; raceme-fascicles compound | ... | 1. <i>C. jwarancusa</i> . |
| B. Basal leaf-sheaths in dense tufts, tightly clapping, thickened below; blades more or less filiform and flexuous, except when very short; raceme-fascicles more or less simple | ... | 2. <i>C. schoenanthus</i> . |

- C. Sessile spikelets lanceolate or ovate- or obovate-lanceolate; back flat. Lowest pedicel of raceme scarcely stouter than the upper. All the spikelets awnless 3. *C. nardus*.
- D. Sessile spikelets linear to lanceolate-linear, awnless; back distinctly concave in the lower part; panicle usually loose; branches slender, the ultimate branchlets more or less nodding; spathes long and narrow; hairs of joints and pedicels rather spreading 4. *C. citratus*.

1. **Cymbopogon jwarancusa** Schult. (= *Andropogon jwarancusa* Jones) is found in the outer hill zone of the United Provinces, Kumaon, Garhwal, and westwards as far as Peshawar, Jodhpur and Jaisalmer, Sind, Bihar. It occurs in Western Tibet, ascending to 8,000 ft., and extends westwards to North Africa.

The plant is described by both Ayurveda and Yunani writers.

This grass is used to purify the blood, and in coughs, chronic rheumatism and cholera. It is recommended as a valuable aromatic tonic in dyspepsia, especially that of children. It is also used as a stimulant and sudorific in gout, fever and rheumatism.

The flowers are astringent and are used to stop haemorrhage.

When a Baluchi has fever, a large quantity of this grass is collected and made into a bed. He lies on it and at once begins to sweat.

Arabic: Izkhair—; *Baluchi*: Haveh—; *Bengal*: Gandhavena, Ibarankusha, Karankusa—; *Bombay*: Ibarankusa, Iwarankusa, Izkhir, Kurankusa—; *Brahui*: Have, Haveh—; *Canarese*: Kari lavancha—; *Gujerati*: Jalavalo, Khadajala, Pilovalo—; *Hindi*: Bur, Ghatyari, Ibarankusha, Karankusha, Khavi, Khawi, Khoi, Lamjak, Panni, San, Solara—; *Marathi*: Izkir, Lavaja, Pivalavala—; *North-West Provinces*: Bad, Ganguli, Misiyaban, Piriya—; *Persian*: Gurgiyah—; *Punjab*: Bur, Ghatyari, Ibarankusha, Karankusha, Khavi, Khawi, Khoi, Lamjak, Panni, San, Solara—; *Sanskrit*: Amrinala, Avadahaka, Avadataka, Dirghamula, Isthakapathika, Jalashaya, Jwarankusa, Laghu, Lamajjaka, Laya, Nalada, Sevyā, Shighra, Sunala, Sunila—; *Tongking*: Co de—.

2. **Cymbopogon schoenanthus** Spreng. (= *Andropogon schoenanthus* Linn. = *A. laniger* Desf.) is found in the hotter parts of India, wild or cultivated, from the Punjab to Burma and southwards to Travancore and Ceylon. It extends to Afghanistan and through North Africa to Morocco; it also occurs in Eritrea, Socotra and Somaliland.

Ayurvedists describe the grass as acrid, bitter and pungent; useful in fevers, bronchitis, pains, leprosy, heart and throat troubles, and epileptic fits in children.

In Mahomedan medicine it is prescribed as a diuretic, emmenagogue and deobstruent, also as a stimulant to promote perspiration and expectoration.

A decoction of the plant is given as a febrifuge. It is used in China against oppression and spasmodic dyspnoea.

A strong infusion of the grass is commonly used in Egypt as an antispasmodic and diuretic, and is reputed to have valuable results, especially in promoting the passage of urethral stones.

The oil is considered a powerful stimulant when applied externally. It is used as a liniment in chronic rheumatism and neuralgia, and is believed to have the property of curing baldness.

The root and the stem are popular snake and scorpion remedies; but Caius and Mhaskar have demonstrated experimentally that both of them are useless in the antidotal treatment of either snake bite or scorpion sting.

Arabic: Izkhir, Mahareb—; *Bengal:* Agyaghas, Gandhabena, Kamakarpura—; *Bicol:* Baliyoc—; *Bombay:* Rohisha, Rosegavat—; *Cairo:* El-mahareb—; *Canarese:* Vasanchullu—; *Ceylon:* Camel Grass—; *Chinese:* Cha Yang, Che Yang, Mao Hsiang, Yang Mao Ts'ao—; *English:* Camel Grass, Camel Hay, Geranium Grass—; *French:* Barbeau musqué, Chiendent musqué, Foin de chameau, Gramen oriental, Junc odorant, Pâture de chameau, Schoenantho, Schoenantho odorant—; *French Guiana:* Citronnelle—; *Port Sandeman:* Sargarah—; *Gujerat:* Roshdo, Roshgas, Rusaghas, Rush, Rushgas—; *Hassan:* Ezkryr—; *Hedjaz:* M'haz, Ulfaz udwiyah—; *Hindi:* Bujina, Ghandbabela, Ghatyari, Gundbel, Khavi, Mirchiagand, Musel, Palakhari, Rohisha, Rousaghas, Saundhiya—; *Hova:* Fiahana, Fiahina, Fiehana, Verofehana, Veromanitra—; *Italian:* Fieno di camelo—; *Jhalawan:* Hawai—; *La Reunion:* Citronnelle—; *Las Bela:* Pui—; *Malayalam:* Sirek—; *Marathi:* Rohisha, Rosegavat, Rushgavat—; *Matheran:* Rusha—; *New Caledonia:* N'Dowi—; *North-West Provinces:* Bujina, Palakhari—; *Persia:* Gorgiyah—; *Philippines:* Paja de meca, Raiz de moras, Salaid—; *Punjab:* Ranus, Rauns—; *Sanskrit:* Bhustrina, Bhuti, Bhutika, Devajagdba, Dhupagandhika, Dhuyama, Dhuyamaka, Katrina, Paura, Putimugdala, Rohisha, Rohishatrina, Saugandhika, Shyamaka, Sugandhatrinashita, Sushitala—; *Shahrig:* Sargarah—; *Sivaliki:* Mirchiagard—; *Spanish:* Esquenanto, Paja de camello, Paja de la Meca—; *Tagalog:* Salai, Salay, Tanglad—; *Tamil:* Kamachipillu, Kavattampillu, Vassinapillu—; *Tehran:* Azkar—; *Telugu:* Kamachikussu—; *Visayan:* Tanglad—.

3. **Cymbopogon nardus** Linn. (= *Andropogon nardus* Linn.) occurs throughout the hotter parts of India, Burma, the Malay Peninsula, and Ceylon, wild or cultivated, common everywhere. It extends to tropical Asia, Africa and Australia.

The infusion of the leaves is used as a stomachic and carminative.

The oil is stimulant, carminative, antispasmodic and sudorific. It is used as rubefacient.

In Cambodia the flowers and the leaves are considered good against cough, and sudorific; the roots are used as a diuretic, sudorific and antiperiodic.

Bengal: Kamakher, Kurankosha—; *Burma:* Singoumia—; *Cambodia:* Sakrey, Slek Rey—; *Canarese:* Gandahanchikhaddi, Kamakshihullu—; *Deccan:* Ganjni—; *English:* Citronella Grass—; *Hindi:* Ganjni, Ganjnikaghas, Iwaran-kosa, Pustburn—; *Hova:* Verofehana—; *Indo-China:* Citronnelle, Hung nghe huyen, La sa, Satrey—; *Malay:* Sereh wangi—; *Malayalam:* Chorapulla, Kamakshipulla—; *Marathi:* Ganjni, Usadhana—; *Sinhalese:* Maana, Mana, Pengirimana, Watusaewendara—; *Spanish:* Espicanardo espurio—; *Tamil:* Kavattampillu, Kamachipillu, Mandappillu, Sukkunarappillu, Sunnarippillu—; *Telugu:* Kamakshikasuvu, Kamachikussu, Kamanchigaddi—; *Zulu:* ubungu—.

4. **Cymbopogon citratus** Stapf. (= *Andropogon citratus* D.C.) is only known in the cultivated state. Probably of Indian origin it is now widely distributed over the tropics of both hemispheres.

Ayurvedists describe the grass as pungent, bitter, sharp and hot. They say it is a good laxative, an aphrodisiac and anthelmintic; useful in bronchitis, leprosy and epileptic fits.

An infusion of the leaves is a popular sudorific, stimulant, antiperiodic, very frequently given in simple catarrh. As a fever drink it has great effect in inducing a remission or intermission by bringing on sweat; and it is especially successful with weakly

subjects or when the fever is of a typhoid type. It is also used as a medicinal vapour bath in mild cases of fever, or as an inhalation.

The roots and tender leaves are sometimes given with black pepper in cases of disordered menstruation and in the congestive and neuralgic forms of dysmenorrhoea.

In flatulent and spasmodic affections of the bowels, and in gastric irritability, the oil is a remedy of value. In cholera it proves very serviceable, not only by allaying and arresting the vomiting, but by aiding the process of reaction as well. Applied externally, it forms an excellent embrocation in chronic rheumatism, neuralgia, sprains and other painful affections. Externally it is also used for the ringworm.

In the Gold Coast the leaves are often boiled in water like tea, and the liquor is drunk to cure fever. It is sometimes put into hot bath water, and the patient stands in the hot vapour given off. This is also said to be a good cure for fever.

Bengal: Gandhabena—; *Burma*: Sabalin—; *Canarese*: Kavanche hullu, Majjigebullu, Puralibulla, Vasanebullu—; *Chinese*: Mao Hsiang—; *Colombia*: Limoncillo—; *Deccan*: Hazarmasalah—; *English*: Lemon Grass, Melissa Grass—; *French*: Chiendent citronnelle, Verveine des Indes Orientales—; *Gujerati*: Lilacha, Lilicha—; *Hindi*: Gandhatrina—; *Indo-China*: Huong mao thao, La sa, Sacrey, Say sa—; *Java*: Sireh—; *Malay*: Sereh makan—; *Malayalam*: Shambharapulla, Vasannappulla—; *Marathi*: Hirvacha, Olancha, Olencha—; *Persian*: Chaekashmiri, Hazarmasalah—; *Portuguese*: Herba cheiroa, Capim do Cheiro—; *Sanskrit*: Abichhatraka, Atigandha, Badhira, Badhiradhvanibodhana, Bhustrina, Bhutina, Chhatra, Gochhalaka, Guchhala, Guhyabija, Gundardha, Jambukapriya, Karenduka, Kutimbaka, Malatrinaka, Punsavavighraha, Putigandha, Roshisha, Samalambi, Shringaroha, Sugandha—; *Sinhalese*: Penquin, Saira—; *Spanish*: Grama de limon, Limoncillo—; *Tagalog*: Tanglad—; *Tamil*: Karapurappillu, Vasannappillu—; *Telugu*: Chippagadi, Nimmagaddi, Vasangaddi—; *Venezuela*: Citronera, Limonera, Malojillo—.

CYNODON.

Of the 7 species which constitute this genus, 1 is cosmopolitan, the others Australian and South African.

C. dactylon Pers. is used medicinally in Madagascar, La Reunion and South Africa; *C. hirsutus* Stent. in Basutoland.

C. bradleyi Stent. yields hydrocyanic acid.

Cynodon dactylon Pers. is cosmopolitan and distributed through all warm countries. It is found throughout India, Burma and Ceylon, ascending to 5,000 ft. in the Himalaya.

A decoction of the root is chiefly used as a diuretic in South India and in Chota Nagpore. In Mysore it is employed for secondary syphilis.

The cold infusion of the root often stops bleeding from piles.

The roots crushed and mixed with curds are a Deccan remedy for chronic gleet.

The expressed juice of the plant is an Ayurveda specific for hysteria, epilepsy and insanity.

The expressed juice of the plant, however, is a popular astringent commonly used as an application to fresh cuts and wounds and given internally in cases of chronic diarrhoea and dysentery.

It is also diuretic and used in cases of dropsy. It has moreover been found useful in catarrhal ophthalmia.

In the Konkan the grass is prescribed in compound decoctions with more active drugs for the cure of dysentery, and abnormally profuse menstruation. A white variety, which appears to be only a diseased state of the plant, is used medicinally by the native Hindu practitioners. It is acidulous and is given to check vomiting in bilious complaints.

A preparation of the plant is applied by the Santals in a parasitic disease, which attacks the spaces between the toes.

In Madagascar the whole plant, or the rhizome alone, is applied specially in gout and rheumatic affections.

An infusion of the plant is taken as a tonic in Venezuela.

Europeans in the Transvaal use the plant for heartburn. It is taken bruised and mixed with sodium bicarbonate and other substances. The bruised plant alone is applied as a styptic to wounds.

The Xosas use a decoction as a lotion for sores and swellings.

Mhaskar and Caius have shown that the plant is not an antidote to either snake venom or scorpion venom.

Afrikaans: Batawiese kweek, Fynkweek, Kwagga, Kwaggakweek, Kruisgras, Oostindiese kweek—; *Antsianaka*: Arampandrotra—; *Arabic*: Nagil—; *Baluchi*: Milinu—; *Bengal*: Dub, Dubla, Durba—; *Betsileo*: Kindrese—; *Bombay*: Harala, Haryali—; *Canarese*: Garikehulla, Karkeri hullu, Kudi garikai—; *Catalan*: Agram, Gram—; *Central Provinces*: Dhupsa, Hariali—; *Chinese*: Ko Oung—; *Cuba*: Grama—; *Cutch*: Chhabar, Chhabbar—; *Egypt*: Nediil, Negil, Nishil, Nisiil—; *English*: Bahama Grass, Bermuda Grass, Couch Grass, Creeping Panic Grass, Devil's Grass, Doab Grass, Dog's Tooth Grass, Doob Grass, Doorwa, Doub Grass, Dun Grass—; *French*: Chiendent pied de poule, Gros chiendent, Herbe des Bermudes, Pied de poule—; *Greek*: Agria, Agriada—; *Guam*: Grama—; *Gujerat*: Dhro, Dhrokad, Gharo, Khabbal—; *Hausa*: Kiri kiri, Tsar-Kiyar zomo, Tsirkiar zomo—; *Hawaii*: Manienie—; *Hindi*: Dhoboghas, Dub, Dubra, Durba, Huriyala, Kalighas, Kabbar, Ramghas—; *Hova*: Fandrotararana—; *Indo-China*: Co chi trang, Co ong, Hanh nghi chi—; *Iraq*: Thaiyil—; *Jhalawan*: Char, Chobi, Godmaz—; *Kolami*: Dhobighas, Dubi—; *Konkani*: Dhurva, Harialy—; *Languedoc*: Limaouça—; *Lao*: Ya Pet—; *Las Bela*: Sabah—; *Loanda*: Capim dos caballos—; *Loralai*: Sabah—; *Madagascar*: Kindresy—; *Malta*: Capriola, Couch Grass, Doub Grass, Gramigna, Nigem—; *Marathi*: Dhurva, Durva, Harialy, Karala—; *Menabe*: Fandrahana—; *Mundari*: Dubila, Dubilatasad, Dubitasad—; *Nairobi*: Uganda Grass—; *Nisirabad*: Kabb—; *North-West Provinces*: Duba, Kalighas, Ramghas—; *Pacific Coast*: Bermuda Grass, Dog's Tooth Grass, Indian Couch Grass, Scotch Grass, Wire-Grass—; *Panjour*: Shez—; *Punjab*: Daurva, Dun, Dubra, Kabbar, Khabbal, Talla, Tilla—; *Rajputana*: Dob, Nilldub—; *Rarotonga*: Mati—; *Sadani*: Dublaghas—; *Sakalave*: Fandrotsana, Fandrotsarana—; *Sanskrit*: Amari, Amrita, Ananta, Anuvallika, Asitalata, Bahuvirya, Bhargavi, Bhutahantri, Dhurta, Dhurva, Durmara, Gauri, Guna, Harasalika, Harita, Haritali, Jaya, Kachharuba, Mahaushadhi, Mahavari, Mangala, Nanda, Niladurva, Ruba, Sahsravirya, Saumya, Shadvala, Shambhavi, Shanta, Shashpa, Shataparva, Shatagranthi, Shatavalli, Shatmula, Shita, Shitakumbhi, Shitala, Shiva, Shiveshta, Shyama, Tiktaparva, Vamini, Vijaya—; *Santali*: Dhobighas, Dubi—; *Sind*: Chhabar, Chhabbar, Chibbur—; *Sokoto*: Kirikiri, Tsarkryar-zomo, Tsirikiarzomo—; *South Africa*: Bahama Grass, Bermuda Grass, Bermuda Quickgrass, Devil's Grass, Doab Grass, Dub Grass, Fine Couchgrass, Florida Grass, Germiston Grass, Scotch Grass—; *Spanish*: Grama común—; *Suto*: Mohlwa, Morara—; *Tagalog*: Cautauran, Colatay, Malit—; *Tamil*: Arugampilla, Hariali—; *Tasmania*: Indian Couch—; *Telugu*: Ghericha, Gurka hariali—; *Trans Indus*: Burawa—; *Transvaal*: Quagga Quick—; *Upper Godavery*: Haryali—; *Urdu*: Dub—; *Uriya*: Dubbulaghanso—; *Uruguay*: Gramilla, Gra-

milla colorada, Gramilla del tiempo, Pata de perdiz—; *Virginia*: Wire Grass—; *West Indies*: Bahama Grass—; *Xosa*: uQuaqaqa—; *Zulu*: isiNandi, umFulwane, uNgwengwe—.

DACTYLOCTENIUM.

The genus consists of 5 species inhabiting warm regions, one widely spread throughout the tropics.

Dactyloctenium aegyptium Rich. (= *Eleusine aegyptiaca* Desf.) is spread throughout the low country of India and Burma, to Malacca and Ceylon. It is also known from Egypt, Nubia, Eritrea, Arabia and other countries of Tropical Asia and America. It was introduced into the New World from the warm regions of the Old.

The grains are used medicinally by the Mundas of Chota Nagpore; they are parched in an earthen vessel and consumed in small doses for three to eight days by women who after childbirth suffer from belly-ache.

A decoction of the seeds is renowned in Africa as an alleviator of pains in the region of the kidney, and its herbaceous parts are applied externally for the cure of ulcers.

Annam: Co chi trang—; *Australia*: Egyptian Finger Grass—; *Bombay*: Mhar, Nachani, Nagli, Natchni, Raj—; *Bundelkhand*: Makamakna, Tipakia—; *Central Provinces*: Chikara, Chotamandiya, Mathna, Utesirkum, Utesirla—; *Egypt*: Im-es-salib, Rigl-el-herbayeh—; *English*: Goose Grass—; *Hausa*: Gudegude—; *Hindi*: Makra, Makri—; *Malayalam*: Kavarapullu—; *Mundari*: Bulungcuri, Bulungkode, Bulungruti, Bulungrutui—; *Natal*: Inane—; *Philippines*: Salai maya—; *Punjab*: Bhobra, Chimbari, Chubrei, Karmadhana, Madana, Madhana—; *Rajputana*: Malicha, Maligha, Mansa—; *Sarani*: Nonmarua—; *Santali*: Santubukrui—; *Sinhalese*: Putatana—; *South Africa*: Coast Grass, Duck Grass—; *Tagalog*: Alam—; *Tamil*: Sodi, Tamida—; *Telugu*: Muttengapilla—; *Transaal*: Egyptian Kweek-grass, Natal Kweek-grass—; *United States*: Comb Fringe Grass, Crowfoot Grass, Little Crowfoot—; *Uriya*: Kakuriya—; *Zulu*: isiNandi, isInane, uNgwengwe—.

DENDROCALAMUS.

This genus numbers 24 species, which inhabit the Indo-Malayan region, the Philippine Islands, China and Africa.

Dendrocalamus strictus Nees is found in the dry hills of Northern India, from Garhwal to Nepal and southwards from the Punjab to Bihar, the Konkan, Central and South India, Burma and Great Cocos Island. It extends to Java.

The leaves are boiled in water for convalescents to bathe in.

A decoction of the leaves is given to aid parturition; the juice in two-ounce doses taken frequently is used as an abortifacient.

In Arabia the joints are made into a decoction and used as a medicine to procure abortion.

The minute hairs found on the sheath leaves are used by the Malays as a poison; it is given either alone or in combination with other things.

Baigas: Bhiru—; *Bengal*: Karail—; *Bombay*: Bas, Bassa, Kaban, Udha, Vassa—; *Burma*: Myinwa—; *Canarese*: Bidiru, Gandubediru, Kibbidary, Kiri-bidiru—; *English*: Male Bamboo, Solid Bamboo—; *Gond*: Halpa, Vadur, Veddar—; *Gujerat*: Nakorvans, Narvans, Vans—; *Hindi*: Bans, Banskaban,

Banskhurd, Kopar, Lakdibans, Narbans—; *Khond*: Maringi—; *Kolami*: Burumadh, Burumat, Mathan, Saring—; *Kumaon*: Bans—; *Kurku*: Indo—; *Lambadi*: Vasi—; *Malay*: Buloh batu, Buloh berang, Buloh tempat—; *Malayalam*: Arinkantam, Cheriyaamula, Kalmula, Kalmungil, Karinalimula, Karinkana—; *Marathi*: Bans, Bharilvel, Bhovalit, Vela—; *Mundari*: Birmad, Burumad, Janggamad—; *Palamow*: Bukhar—; *Pandratola*: Kark—; *Reddi*: Kondaveduru—; *Sanskrit*: Vansha, Venu, Yavaphala—; *Santal*: Burumadh, Burumat—; *Saora*: Kondaveduru—; *Tamil*: Karanai: Kalmungil, Kattumungil, Mungil, Sinnamungil, Sirumungil, Siruvari—; *Telugu*: Chittiveduru, Gattiveduru, Kanaveduru, Penveduru, Potuveduru, Rativeduru, Sadanapaveduru, Sannaveduru, Veduru—; *Thana*: Bundi, Manwel—; *Tulu*: Lavakiri, Panjibedru—; *Uriya*: Saliabans, Saliabhanso, Salimbo, Salimbobaunso, Salimbo bhanso, Sanobaunso—.

DESMOSTACHYA.

The only species of the genus is *D. bipinnata* Stapf. (= *Eragrostis cynosuroides* Beauv.). It is found in the plains of India, from Peshawar and Sind to Burma and southwards, in hot dry places. It extends westwards to Syria, Egypt, Nubia and East Tropical Africa.

The culms are diuretic and stimulant. In the Konkan they are prescribed in compound decoctions with more active drugs for the cure of dysentery, and profuse menstruation.

Afghanistan: Drab, Kuthag—; *Bengal*: Kusha—; *Bolan*: Drab—; *Bombay*: Darbh—; *Brahui*: Drak—; *Bundelkhand*: Dabvi—; *Central Provinces*: Chir, Dabhat, Kusha—; *Egypt*: Ambarfe, Halfa, Hamarte, Gash—; *Gazechah*: Kuthag—; *Gujerati*: Dabha, Darabha—; *Hindi*: Dab, Davoli, Durva—; *Kani*: Kuthag—; *Kila Saifulla*: Sparmaghaz—; *Libya*: Halfa—; *Marathi*: Darbha—; *North-Western Provinces*: Dab, Daboi, Dhab, Kush—; *Punjab*: Dab, Dhab, Dib, Drab, Drabh, Kusa—; *Sanskrit*: Barhi, Darbha, Durbha, Garbha, Hrasva, Kurava, Kusha, Kutha, Kutupa, Pavitra, Suchyagra, Yajnabhushana—; *Shahrig*: Dab—; *Sibi*: Drab—; *Telugu*: Aswalayana, Dabha, Darbha, Durpa, Kusadarbha—; *Turbat*: Ding, Drab—.

ECHINOCHLOA.

This genus consists of 20 to 25 species distributed throughout the warm regions of both hemispheres.

E. colona Link. var. *frumentacea* Blatter and McCann, and *E. crus-galli* P. Beauv. are used medicinally in China.

1. Upper involucreal glume and lower floral glume equally acute or cuspidate *E. colona*.
2. Upper involucreal glume and lower floral glume cuspidate or produced into an awn, the latter more than the former. Ligule absent *E. crus-galli*.

1. *Echinochloa colona* Link var. *frumentacea* Blatter & McCann (= *Panicum frumentaceum* Roxb.) is cultivated over the greater part of India, up to 6,500 ft. on the Himalaya.

The plant is said to be a good remedy useful in biliousness and constipation.

America: Billion Dollar Grass—; *Baluchi*: Samako—; *Bengal*: Samra-shama, Sanwa, Saon, Shama, Shamula, Syamadhan—; *Bihar*: Sama, Sanwan, Sawan—; *Bombay*: Bavto, Sama, Samuka, Sanwak, Shama—; *Canarèse*: Same, Sava—; *Central Provinces*: Sawa, Sema—; *Chinese*: Shan Tzu—; *Deccan*: Kangra, Kathi, Kathli, Sanwa, Saon, Sawa Shama, Shamula—; *English*: Japanese Barnyard Millet—; *Garhwal*: Jhungara—; *Gujerat*: Samo, Samoghas, Janglisamak—; *Hindi*: Samak, Sanwa, Sawa, Sawan, Shama, Shamula—; *Kashmir*: Karin, Soak—; *Khondmals*: Jhari—; *Kumaon*: Jhangora,

Koni, Kungni, Mandira—; *Malay*: Padi burong—; *Marathi*: Janglisama, Samul—; *North-Western Provinces*: Jhungara, Saman, Sawan—; *Oudh*: Sama, Samei, Sanwan, Sawan, Sawanbhadeha—; *Persian*: Bajri—; *Punjab*: Chandra, Sama, Samuka, Sanwak, Sawank, Soak—; *Sanskrit*: Avipriya, Rajadhanya, Shyama, Shyamaka, Sukumara, Tribija, Trinabijottama—; *Sind*: Saon, Saron—; *Sinhalese*: Welmarukku—; *Tamil*: Kudraivallipillu, Railpillu—; *Telugu*: Bontachamalu, Bontashama, Bonthshama, Chama, Chamalu, Pala oodalu, Sawa—; *Uriya*: Samu—.

2. **Echinochloa crus-galli** P. Beauv. (= *Panicum crus-galli* Linn. = *P. crus-corvi* Linn.) is common throughout the greater part of India and Malaya; as a weed it is found throughout the warm temperate countries of the northern hemisphere. It is somewhat rare in the tropics of Africa and the New World, and south of the Tropic of Cancer.

The plant is used to check hæmorrhage, and is prescribed for diseases of the spleen.

Australia: Barnyard, Cockspur Grass—; *Baluchi*: Samo—; *Bengal*: Barashama, Dul—; *Betsileo*: Ahibary, Aibary—; *Bombay*: Borur, Jiria, Pakud, Pakushama, Sawank, Todia, Tor—; *Canarese*: Kadu dabhai hullu—; *Central Provinces*: Baribhodore, Bharta, Datia, Kondabuttangodi—; *Chinese*: Pai—; *Dutch*: Vingergras—; *Egypt*: Dineyb—; *English*: Panic Grass—; *French*: Crête de coq, Ergot de coq, Millard, Panis des marais, Panis pied de coq, Patte de poule, Pied de coq—; *German*: Hahnenfussfennich—; *Greek*: Kechri—; *Gujerat*: Adbausamo—; *Hindi*: Samak, Sanwak—; *Hova*: Fari-manga, Tsimparifarifolsy, Tsimparifarifary, Tsimparifarimango, Tsimparifarimena—; *Iraq*: Dahnan, Danan, Dukhain—; *Italian*: Cresta de gallo—; *Malta*: Panickgrass, Cock's shin Grass, Panicastrella, Xrika—; *Marathi*: Sama—; *Mundari*: Camatasad, Iri—; *North-Western Provinces*: Dhand, Jalsawank—; *Punjab*: Barasanwak, Bharti, Dhand, Jarotha—; *Rajputana*: Horma, Sama, Siwan—; *Roumanian*: Bujorul—; *Sadani*: Sauna, Sawa—; *Sakalave*: Karangy—; *Sanskrit*: Jalasamaka—; *Spanish*: Daza, Mijo—; *Tagalog*: Dauadaua—; *Telugu*: Peddawundu—; *United States*: Barnyard Grass—; *Uruguay*: Pata de gallo—.

ELEUSINE.

This genus consists of 10 species distributed over the warm regions of the eastern hemisphere, one being widely spread throughout the tropics.

E. coracana Gaertn. is used medicinally in South Africa, *E. indica* Gaertn. in Guiana and Cambodia.

- | | | |
|--|-----|--------------------------|
| 1. Spike stout, often incurved, pubescent at base. | | |
| Seed globose | ... | ... <i>E. coracana</i> . |
| 2. Spike slender, nearly glabrous at base. Seed | | |
| oblong, obtusely trigonous | ... | ... <i>E. indica</i> . |

1. **Eleusine coracana** Gaertn. is cultivated throughout India and in many parts of tropical Africa and tropical Arabia.

Ayurveda authors describe the grain as acrid, bitter and sweet and cooling. They consider it tonic, and recommend it in biliousness and blood diseases.

The grain is generally used as an astringent.

In South Africa the Tongas and Shangaans use it along with *Plumbago zeylanica* Linn. as an internal remedy for leprosy.

Abyssinia: Talban—; *Bengal*: Marua, Murha—; *Bombay*: Nagli, Nangli—; *Canarese*: Raggi, Ragi—; *Egypt*: Bishna—; *Eritrea*: Dagussa—; *French*: Coracan, Eleusine coracana—; *Golungo Alto*: Luco, Loco—; *Gujerati*: Bavtonagli, Navtonagli—; *Hadramout*: Dokhn—; *Hausa*: Tamba—; *Hindi*: Makra,

Mandua, Marua, Maud, Murua, Rotka—; *Katagum*: Tamba—; *Khasi*: U'raitruh—; *Kolami*: Kode—; *Konkani*: Gonddo, Nachno—; *Malayalam*: Chetti-pulli, Mutami—; *Marathi*: Nachiri, Nagli—; *Mundari*: Dasaikode, Dumbakode, Kode—; *Natal*: Upoko—; *Nile*: Ooleyzei—; *Northern Nigeria*: Tomba—; *North-West Himalayas*: Koda, Kodon, Kodra, Kutra—; *North-West Provinces*: Makra, Mandua, Marua, Rotka—; *Oudh*: Makra, Mandua, Marua, Rotka—; *Persian*: Mandwah—; *Portuguese*: Nachinim—; *Punjab*: Chalodra, Koda, Kodon, Kodra, Mandal—; *Sanskrit*: Bahupatraka, Bhuchara, Guchha, Kadhina, Kanisha, Lanchhana, Maliyasa, Narataka, Nriyakuunda, Ragi, Raji, Rajika—; *Santali*: Kode—; *Shangaan*: Liphokho—; *Sind*: Nachni, Nangli—; *Sinhalese*: Kurakka—; *Tamil*: Kalvaragu, Kapai, Kayur, Ragi—; *Telugu*: Chodalu, Ponassa, Ragi, Ragulu, Sodi, Tamidelu—; *Ungoro*: Bolu—; *Urson*: Kodai—; *Uriya*: Mandia—; *Zambesi*: Marumbi, Mitchinin—; *Zanzibar*: Vimbe—; *Zulu*: uPoko—.

2. **Eleusine indica** Gaertn. is found growing throughout the plains of India and Ceylon. It is common in the tropics of the Old World. It is naturalized in the Mediterranean region, and is said to have been introduced in the New World.

The whole plant, but more especially the root, is considered sudorific and febrifuge in Cambodia. It is much used in liver complaints.

In Guiana a decoction of the plant is given to children for convulsions.

Bundelkhand: Gurchawa—; *Burma*: Hsengnomyeet, Singnomyeet—; *Cambodia*: Choeung Kras—; *Central Provinces*: Godhabba, Gurragadi, Kakariya, Madanya, Malghi, Mandial—; *Cuba*: Pata de gallina—; *French Guiana*: Pied de poule—; *Golungo Alto*: Pê de galinha—; *Guam*: Umog—; *Gujerat*: Adbaunagli—; *Hausa*: Chiyawartuji, Tuji—; *Hindi*: Malankuri—; *Katagum*: Chiyawar tuji, tugi—; *Kolami*: Bir Kode—; *Kumaon*: Mandavi—; *Lagos*: Ese-kana-kana, Gbegi—; *Malay*: Rumpit sambau—; *Marathi*: Ran nachani—; *Mundari*: Kodai, Sukari kodai—; *North-Western Provinces and Oudh*: Gadha, Gadbacharwa, Gathamandwi, Jhingri, Jhinjhor, Lijhar, Makraila—; *Philippines*: Baquisquisan—; *Rajputana*: Mandwa—; *Sesuto*: Moseli—; *Shahrig*: Chhabal—; *Sierra Leone*: Osoekurunyi—; *Sinhalese*: Walkurakkau—; *South Africa*: Crowfoot, Goose Grass, Wild Rapoko Grass—; *Tagalog*: Sabongseabongan, Sambale—; *Tamil*: Thipparagi—; *Telugu*: Karuchodi, Karsodi, Kuror—; *Uganda*: Kasibanti—; *United States*: Goose Grass, Yard Grass—; *Uriya*: Nandia—; *Zulu*: uMunyankomo, umNyankomo, uPoko.

HETEROPOGON.

This genus consists of about 6 species found in the tropical and subtropical regions of the whole world.

H. contortus Roem. & Schult. is used medicinally in China and South Africa.

Heteropogon contortus Roem. & Schult. (= *Andropogon contortus* Linn.) is found in all warm regions. It is distributed throughout India, Burma and Ceylon to the Straits of Malacca, ascending the Himalaya to 5,000 ft. It is common throughout the whole Tropical Africa, and the adjacent islands, ascending in Eritrea to over 8,800 ft. It extends all over Africa, the Mediterranean region, and the tropical and subtropical regions generally.

The root is a stimulant and diuretic.

The Sutos of South Africa use the plant with *Tribulus terrestris* Linn. for the treatment of rheumatism in the hands.

Afrikaans: Steek Grass—; *Bihar*: Chorant—; *Bombay*: Bal, Bale, Dakli-suckal, Italisuckal, Musaneh, Pendrisuckali, Suckal, Suckali kussal, Suckeri—; *Canarese*: Kari vunugada hullu, Sunkari hullu—; *Chinese*: Ti Chin—; *English*: Spear Grass, Wild Oats—; *Ga*: Akorsorfeng, Ananugangi—; *Gujerat*: Dhabsuliyum—; *Hausa*: Bunsurundaji—; *Hawaii*: Pili—; *Hindi*: Kher, Saral, Shurighas, Shurval—; *Ho*: Saiyu—; *Kharwar*: Chorant—; *Kohlu*: Barwu—; *Marathi*: Kant egawta—; *Matheran*: Bal, Kusal, Pandrisuka—; *Mundari*: Sauri—; *Ormara*: Abdarka—; *Sambalpur*: Sukla—; *Santali*: Saurighas—; *Sesuto*: Selokana—; *Shahrig*: Barwaz—; *Somaliland*: Aggar—; *Tamil*: Karunsipullu, Panipullu, Usipullu—; *Telugu*: Dubbagasarigaddi, Eddigaddi, Kaserigaddi, Yedda, Yeddi, Yerragoyi—; *Uriya*: Dauria, Sinkola, Sinkolo—; *Zulu*: isiTupe—.

HORDEUM.

This genus numbers about 25 species, natives of temperate regions, mainly found in the northern hemisphere.

Hordeum vulgare Linn. is cultivated chiefly in North India and up to 13,000 ft. in the Himalaya. It is widely cultivated in all temperate regions.

Both Ayurveda and Yunani writers credit barley with antibilious, antispasmodic, and antifebrile properties, and recommend its use in the treatment of bronchitis.

Barley is demulcent, and easy of digestion, and is for these reasons used in the dietary of the sick. A powder of the parched grains is much employed in the form of a gruel in cases of painful and atonic dyspepsia.

In Patna the ashes of the leaf are employed in the formation of cooling sherbets. The ashes of the stalks are prescribed for indigestion in the plains of the Punjab.

From the earliest times barley has been employed to prepare drinks for the sick, especially in feverish disorders, and for sore lining membranes of the chest. Barley in the form of the decoction popularly known as *barley water*, affords a mucilaginous drink very valuable in all cases requiring demulcent treatment. Pearl barley is the form usually preferred for the preparation of the decoction, made by pouring four pints of boiling water on two Troy ounces of pearl barley and boiling away to two pints, and straining. It is especially used in infant feeding, as it seems to prevent the formation of large milk curds by its colloidal character.

Pearl barley is the seed deprived of all its investments and afterwards rounded and polished in a mill. It is in small round or oval grains, having the remains of the longitudinal furrow of the seeds, and of pearly whiteness. It is wholly destitute of hordein, and abounds in starch, with some gluten, sugar and gum. This is the proper form of barley for medicinal use.

Honey may be added beneficially to the decoction of barley for bronchial coughs. Barley water with gum arabic, one ounce of the gum dissolved in a pint of the hot decoction, is a very useful drink to soothe irritation of the bladder and of the urinary passages.

Barley meal is formed by grinding the seeds previously deprived of their husk. It may be made into a coarse, heavy,

hard bread, which in some countries is much used for food, though apt to purge.

In China barley sprouts are especially prepared for medicinal use. This is done by moistening the grains with water, allowing them to germinate, and then drying them in the sun. The sprouts are rubbed off and the grain ground into flour. The sprouts enter into a number of prescriptions given for infantile complaints.

The germinated barley or malt with the radicle is used in China as peptic, stomachic, lenitive, demulcent and expectorant. Preparations of malt have acquired some reputation of late years in Europe and America, since they are more demulcent and nutritious than those of the unmalted barley.

Barley is official in France, Portugal, Spain and the United States of America.

Afghanistan: Jao, Jaoshirin, Jaotush—; *Arabic*: Shaair, Shair—; *Armenian*: Kari—; *Ashkobi*: Arbus—; *Bagwana*: Brehnajau—; *Behar*: Jowakhar—; *Bengal*: Jab, Jao, Jau—; *Bhotia*: Nas—; *Bombay*: Jav, Satu—; *Brazil*: Cevada, Cevada sancta—; *Burma*: Muyau—; *Canarese*: Javegodhi—; *Catalan*: Ordi, Ordi comú—; *Chinese*: Kung Mai, No Mai, Ta Mai—; *Danish*: Byg—; *Deccan*: Satu—; *Dutch*: Gerst—; *Egypt*: Shair—; *English*: Barley—; *Finland*: Ohva—; *French*: Béchette, Blé d'Égypte, Blé de mai, Epeautre, Epente, Epinte, Espigan, Orge, Orge commune, Orge grosse—; *German*: Garsten, Geste—; *Greek*: Krithari, Krithi—; *Gujerati*: Jau, Jav, Ymvah—; *Harboi Hills*: Jau, Sa, Urbusha—; *Hindi*: Jau, Jav, Jawa, Suj—; *Hungarian*: Arpa—; *Indo-China*: Dai mach, Lua mach nha, Ta me, Thoc mach nha—; *Iraq*: Sha'ir—; *Italian*: Farro, Orzo, Scandella, Spelita, Spelta—; *Jhalawan*: Jau, Sa, Urbusha—; *Kila Saifulla*: Jau, Sa, Urbusha—; *Konkani*: Cevad, Jav—; *Kurdish*: Ju—; *Languedoc*: Espeulto, Espigan, Feraje hordi, Ordi, Ordigal—; *Lapland*: Kordne—; *Lassa*: Soah—; *Malaya*: Mai ngai—; *Malta*: Barley, Orzo, Xghei, Xghei tal birra, Xghei tal mazza—; *Marathi*: Cevad, Jav, Java, Satu—; *Nepal*: Tosa—; *North-West Provinces*: Indarjau, Jau, Yurk—; *Persian*: Jao—; *Polish*: Jenczmien—; *Portuguese*: Cevada—; *Punjab*: Buza, Chak, Chang, Chung, Jaon, Jau, Jawa, Nai, Thanzatt—; *Romanian*: Orz—; *Russian*: Jetschmen—; *Sanskrit*: Akshata, Dhanyaraja, Divya, Hayapriya, Hayeshta, Kanchuki, Medhya, Pavitradhanya, Praveta, Shaktu, Shvetashunga, Sitashuka, Sitrishuka, Tikshnashuka, Turagapriya, Yava, Yavaka—; *Sharig*: Jau, Sa, Urbusha—; *Spanish*: Cebada, Cebada común—; *Swedish*: Bingg—; *Tamil*: Barliyarisi, Barliyarishi—; *Tartary*: Arpah—; *Telugu*: Barlibiyam, Dhanyabhedam, Pachchayava, Yava, Yavaka, Yavala—; *Turkish*: Arpa—; *Urdu*: Jav—; *Yemen*: Schair—.

HYGROHIZA.

H. aristata Nees., the only species of this genus, is found in the upper and lower Gangetic Plains, Assam, Chittagong, Pegu, the Deccan and Ceylon, extending to Tongking. It occurs either floating on the surface of water, or creeping on wet ground.

Ayurveda describes the seeds as sweet and acrid, oleagenous, digestible and cooling. They are astringent to the urinary tract, and useful in biliousness. They cause constipation and flatulence.

Bengal: Uridhan—; *Bombay*: Deobhat, Urodhan—; *Canarese*: Jyarahumedhe—; *Gujerati*: Vanti—; *Hindi*: Janglidal, Tili, Tini—; *Malayalam*: Nirvallipullu—; *Marathi*: Deobhata—; *North-Western Provinces*: Parsal, Passahi, Passai, Passari, Tinni—; *Punjab*: Pastal—; *Sanskrit*: Aranyadhanya, Aranyajali, Munidhanya, Nivara, Prasadhika, Trinadhanya, Trinodbhava, Vana-vrihi—; *Sinhalese*: Gojabba—; *Tamil*: Valli pullu—.

IMPERATA.

This genus consists of 5 tropical species found in the warm regions of both hemispheres, but chiefly American.

Imperata arundinacea Cyrill. (= *I. cylindrica* Beauv.) is found in the hotter parts of India, from the Punjab southwards and eastwards, to Malacca and Ceylon. It grows in all warm countries and often covers enormous areas. When entering cultivated land it may become a serious pest.

The roots are used as an emollient in Cambodia, mostly in the fumigation of piles.

The roots are much appreciated in China for their restorative, tonic, haemostatic and antifebrile properties.

The Sutos of South Africa use the root in making a medicine for chest colds in children, while the Zulus regard it as a specific for hiccough.

Australia: Blady-grass—; *Baluchi*: Drug—; *Bengal*: Ulu—; *Bhabar*: Shiro—; *Bombay*: Dhub—; *Burma*: Thek-kay nyen—; *Cambodia*: Sbeou—; *Canarese*: Sanna dabbai hullu—; *Cantonese*: Pak mau kan—; *Chinese*: Mao Tsao, Pai Mao Ken—; *Hausa*: Tofa, Toha—; *Hindi*: Dabh, Siru, Ulu—; *Hora*: Tenina, Tenona, Tsevoka—; *Indo-China*: An do bach mao, Co danh, Mao ken, Tranh—; *Iraq*: Halfah, Shismallah—; *Kolami*: Chero—; *Malay*: Alang alang, Lalang—; *Malaya*: Pak mau kan—; *Mundari*: Huringciru—; *North-Western Provinces*: Shiro—; *Punjab*: Siru, Ulu—; *Sakalave*: Manevica—; *Sanskrit*: Balbajamu, Barhissu, Darbha—; *Santali*: Chero—; *Simla*: Dab—; *Sinhalese*: Iluk—; *Southern Nigeria*: Spear Grass—; *Suto*: Mohlabalerumo, Mohlorumo—; *Tamil*: Dharbai pul, Tharpaipillu—; *Telugu*: Barumbiss, Dharba, Modavagaddi—; *Uganda*: Lusanke—; *Upper India*: Bharwai, Sil, Sir, Usirh—; *Zulu*: umThente—.

LOLIUM.

This genus includes 6 species, natives of Europe, temperate Asia, and North Africa; but naturalised in many countries.

Many of the species are reputed to possess a poisonous principle.

Lolium temulentum Linn. is an annual weed of cultivation, also occasionally met with as a wayside weed and in waste ground, common in the plains and hills of the Upper Gangetic Plain, the Punjab, the North-West Provinces ascending to 4,000-6,000 ft. in the Himalaya, and Sind. It extends throughout Europe and Western Asia, has been found in the island of Madura and in North Africa, and occurs as an introduced plant in the United States and Australia.

The seeds or grains were used medicinally by the ancient Greeks and Romans. The old sages, however, supposed it to cause blindness, and with the Romans, *lolo vicitare*, to live on Darnel, was a phrase applied to a dim-sighted person. Gerard says, 'The new bread wherein Darnel is eaten hot, causeth drunkenness'. A general trembling, followed by inability to walk, hindered speech, and presently profound sleep with subsequent headache and vomiting, are the symptoms produced by Darnel when taken in a harmful quantity.

'As it is not without some vices', says Culpeper, 'so hath it also many virtues. The meal of Darnel is very good to stay gan-

grenes and other such like fretting and eating canker and putrid sores; it also cleanseth the skin of all leprosies, morphews, ring-worms, and the like, if it be used with salt and raddish roots. And being used with quick brimstone and vinegar, it dissolveth knots and kernels, and breaketh those that are hard to be dissolved, being boiled in wine with pigeon's dung and linseed. A decoction thereof made with water and honey, and the places bathed therewith is profitable for the sciatica. Darnel meal applied in poultice draweth forth splinters and broken bones in the flesh. The red darnel boiled in red wine and taken, stayeth the lax and all other fluxes and women's bloody issues and restraineth urine that passeth away too suddenly.'

Darnel meal is still recommended as a sedative poultice, and is still believed to cure freckles.

Catalan: Juy, Sisanya—; *Devonshire*: Eaver, Iver—; *Dutch*: Bolderik, Dolik, Dravik—; *English*: Bearded Darnel, Cheat, Darnel, Jura, Ray Grass, Ryo Grass, Wary, Bragge, Cockle, Dornel, Dragge, Drake, Drank, Dravick, Droke, Drunk, Drunken Plant, Eaver, Ivray, Jum, Lover's Steps, Ray, Riely, Rivery, Sturdy—; *French*: Ivraie, Ivraie annuelle—; *German*: Lolch, Taumelkorn—; *Hindi*: Machni—; *Iraq*: Hanaitab, Ruwaitab, Shailam—; *Italian*: Gioglio, Loglio—; *Maltese*: Sicrana—; *Portuguese*: Joio—; *Roumanian*: Neghina, Selbata, Zizanie—; *Russian*: Plevel, Pshenetz—; *Somersetshire*: Devon Ever—; *Spanish*: Joyo, Zizaña—; *Sussex*: Crop—; *Uruguay*: Joyo, Trigollo, Zizaña—.

LOPHATHERUM.

This genus consists of 2 species inhabiting Indo-Malaya, China and Japan.

Lophatherum gracile Brongn. is found in Tropical Himalaya from Sikkim eastwards, the Khasia and Naga Hills, and Ceylon up to 4,000 ft. It is common along forest paths in the whole Malay Peninsula from Singapore to Kedah, from the plains to 5,000 ft. altitude in the Thaiping Hills and Pahang. It extends to the waste land in China, Japan, Java, Amboyna and New Guinea.

In China the leaves are considered to have antifebrile and diuretic properties.

Annam: Co may, Dam chue diep—; *Chinese*: Tan Chu—; *Malay*: Rumpot jarang, Rumpot Kelurat, Rumpot ubi bulush—; *Sino-malay*: Tham chook—.

MANISURIS.

The one species of this genus, **M. granularis** Sw., is found throughout the hotter parts of India, from the Punjab eastwards to Burma, and southwards to Ceylon. It occurs in most tropical countries.

Anislie says that in Behar the plant is prescribed internally in conjunction with a little sweet oil, in cases of enlarged spleen and liver.

Ajmere: Kangni—; *Berar*: Ratop—; *Chanda*: Agimaligadi—; *Gujerat*: Kasium, Kasiunghas—; *Hindi*: Kangni, Trinpali—; *Naguri*: Buraburuludiasad, Ludiatasad—; *Rajputana*: Dhaturoghas—; *Sanskrit*: Palanggini—; *Sierra Leone*: Ardande, Fesifesi, Guisqui—; *Udaipur*: Dhaturoghas—.

ORYZA.

This genus numbers about 17 tropical species extending to the subtropical regions of both hemispheres.

Oryza sativa Linn. is widely cultivated. It occurs indigenous in the marshes of Rajputana, Sikkim, Bengal, the Khasia Hills, Central India, the Circars and Pegu. It extends to Australia.

Ayurveda describes the rice grain as acrid, sweet, oleagenous, tonic, aphrodisiac, fattening, diuretic and useful in biliousness.

In India rice is used variously in sick diet. It is invariably ordered as the safest and best food in all dysenteric complaints. Boiled rice, when hot, is used as a poultice. Rice-water is recommended as an excellent demulcent, refrigerant drink in febrile and inflammatory diseases, dysuria and other affections requiring this class of remedies. This decoction is also given as an enema in affections of the bowels.

In Cambodia the husk of the grain is considered anti-dysenteric. The roasted grain, mixed with an equal amount of palm-sugar, is prescribed in *Strychnos* poisoning. Boiled in water and then dried in the sun, the grain enters into the composition of remedies for leprous ulcers.

Certain varieties of specially prepared grains are used medicinally in China and Malaya. Malted rice is used as a peptic, carminative and tonic.

In Europe the grain has long been considered to exercise pectoral virtues, and useful for persons troubled with lung disease, and spitting of blood, as in pulmonary consumption. 'The grain stays laxes and fluxes of the stomach and belly, especially if it be parched before it is used, and hot steel quenched in the milk wherein it is boiled, being somewhat drying and binding. The flour of the rice has the same property, and is put into cataplasms to repel humours from flowing to the place, and also to women's breasts to stay inflammations.'

Rice bread and rice cakes, simply made, are very light and easy of digestion. The gluten confers the property of rising, on dough or paste made of rice flour. But as an article of sustenance rice is not well suited for persons of fermentative tendencies during the digestion of their food, because its starch is liable to undergo this chemical change in the stomach.

The grain is officinal in Austria, Belgium, France, Germany, Great Britain, Holland, Italy, Portugal, Spain, Switzerland and Turkey.

Amblaw: Fala—; *Annam*: Lua nep, Lua nui, Lua song lon, Lua te, Lua toc—; *Arabic*: Arruz, Arz—; *Armenian*: Priusch—; *Belgaum*: Bhatta—; *Bengal*: Chal, Chanvol, Dhan, Oridhana—; *Bombay*: Bhatta, Dangar—; *Bouru*: Hala, Halai, Pala—; *Broach*: Dangar—; *Burma*: Chan, Saba, San—; *Cambodia*: Srau damnop, Srau khasai, Srau prapeai vea—; *Canarese*: Akki, Batta—; *Catalan*: Arros—; *Central Provinces*: Deoadhan—; *Ceram*: Fala—; *Chinese*: Ch'en Lien Mi, Hsien, Keng, Tao, Tao Tzen—; *Cochin China*: Lua—; *Danish*: Riis—; *Deccan*: Chanval—; *Dutch*: Rijst—; *East Indies*: Paddy—; *Egypt*: Aras, Ras, Ruz—; *English*: Rice—; *Ewe*: Molung, Morli, Morlu—; *Fanti*: Omo—; *Fatehpur*: Phasai—; *French*: Riz—; *Ga*: Omong—;

Gambia: Mannow—; *German*: Reiss—; *Greek*: Oryza, Oryzion, Oryzon—; *Guam*: Fae, Fai, Faria—; *Gujerati*: Chokha—; *Hausa*: Shinkafa—; *Hazara*: Shali—; *Hindi*: Chaval, Deodhan, Dhan, Pusai—; *Hungarian*: Riskasa—; *Indo-China*: Khao, Nghan, Nhu—; *Iraq*: Shilib, Ruzz—; *Italian*: Riso—; *Japanese*: Ko, Kome, Motsj—; *Java*: Bai—; *Jhang*: Munji—; *Kashmir*: Dein, Tani—; *Khmer*: Srau, Srou, Srur—; *Kolami*: Baba, Birbaba—; *Konkani*: Bhat—; *Krepi*: Morli—; *Krobo*: Omong—; *Kurdish*: Chaltuk, Pishik—; *Laos*: Khao chao, Khao hai, Khao loi, Khao nieu—; *Madagascar*: Vary—; *Malay*: Pady—; *Malayalam*: Ari, Nells—; *Marathi*: Bhat, Tandula—; *Matabello*: Peha—; *Mon*: Sro—; *Mount Abu*: Garri, Sal—; *Mundari*: Baba—; *Mysol*: Fas—; *Mysore*: Bhatta, Nells—; *North-West Provinces*: Chanwal, Dhan, Jarhan, Lehi, Munji, Pusai—; *North Queensland*: Kineyah—; *Oudh*: Dhan, Pashai, Passari, Tinni—; *Palauing*: Rekao, Sakao, Takao—; *Pandran*: Kandabari, Khisumbhuz, Wilaiti—; *Partabgarh*: Sathi—; *Persian*: Biranj—; *Peshawar*: Shol—; *Philippines*: Bolahan, Palai—; *Polish*: Ryz—; *Portuguese*: Arro—; *Punjab*: Dhan, Munji, Shalian, Tai—; *Rajputana*: Garri—; *Rampur*: Phasai—; *Roumanian*: Orez—; *Russian*: Psheno, Ris, Sarachinskoe psheno—; *Sanskrit*: Arunya, Ashuvrihi, Dhanya, Nivara, Shali, Tandula, Vrihi—; *Santal*: Uri, Urihoro—; *Sema*: Aghi—; *Shahrig*: Shali—; *Sind*: Chanwar, Sari, Sugdasi—; *Sinhalese*: Goyan, Hal, Uruwi—; *Spanish*: Arro—; *Sunda*: Pare, Pari—; *Swedish*: Ris—; *Tagalog*: Bigas, Binambang, Bolohan, Dumali, Lamuyo, Malagguit, Palay, Quinanda, Tangi—; *Tamil*: Arishi, Arisi, Nells—; *Tartary*: Dugu—; *Tayabas*: Nilomot—; *Telugu*: Biyam, Dhanyamu, Errajilama, Nevaridhanyamu, Ouri, Uru, Vadlu, Vudlu—; *Tobu*: Shali—; *Turkish*: Pirinj, Pirins—; *Twi*: Aimong, Mong—; *Uriya*: Balunga, Chaul, Dhan, Dhanno, Rabana—; *Xong*: Ruko—; *Zehri*: Pirkalanari—.

OXYTENANTHERA.

This genus includes 16 species occurring in India, Burma, Malaya and Africa.

Oxytenanthera sinuata Gamble is found south of the Malay Peninsula in Johor, and Negri Sembilan; but nowhere very common.

The very fine hairs found on the sheath leaves of the young sprouts are prominent among Malay poisons. They are frequently used with pounded glass and set up a train of symptoms like that of a chronic pseudo-dysentery.

In Kelantan bamboo hairs are sometimes mixed with the juice obtained from *Caryota mitis* Lour. and an extract of toad. This toad extract is made from the common brown toad by allowing it to decompose in a bamboo cylinder containing a little water; after an interval of seven days this is smeared or sprinkled over wearing apparel, and the ingredients are said to set up an incurable and painful skin disease like a ringworm in appearance.

The hairs are mixed with the ground bark of *Wickstroemia ridleyi* Gamble and decayed copra, and then thrown into rivers to stupefy fishes.

Malay: Buloh minyak—.

PANICUM.

This genus is a heterogeneous assemblage of about 400 species, mostly natives of warm regions, a few being found in temperate climates of the northern hemisphere, one or two being almost cosmopolitan.

Many species are much valued as fodder-grasses but a few are said to be toxic to the animals.

I. Annuals.

- a. Spikelets $\frac{1}{2}$ - $\frac{3}{4}$ in. long. Stems tufted, 2-4 ft. long, stout. Leaves 6-12 in. long ... 1. *P. miliaceum*.
 b. Spikelets $\frac{1}{2}$ - $\frac{3}{4}$ in. long. Stem 1-3 ft. long, rather slender. Leaves 1-2 ft. long ... 2. *P. miliare*.

II. Perennials.

- a. Spikelets $\frac{1}{2}$ in. long, laxly clustered on the branches; glume IV smooth. Leaves 6 by $\frac{1}{2}$ in. Panicle 6 in. high ... 3. *P. antidotale*.
 b. Spikelets $\frac{1}{2}$ - $1\frac{1}{2}$ in. long, large, scattered; glume IV finely rugulose. Leaves 1-2 ft. by $\frac{1}{2}$ -1 in. Panicle 1-2 ft. high ... 4. *P. maximum*.
 c. Spikelets small, very numerous, crowded; glume IV smooth. Leaves 5-12 in. by $\frac{1}{2}$ - $\frac{3}{4}$ in. Panicle 7-12 in. long ... 5. *P. sarmentosum*.

1. ***Panicum miliaceum*** Linn. is cultivated or naturalized throughout the hotter parts of India, Africa and other hot countries. It is grown in various parts of India, even up to 10,000 ft. on the Himalaya, but nowhere to any great extent.

Ayurveda writers describe the plant as sweet and acrid, causing biliousness and indigestion.

At Shoran, in Baluchistan, the plant is used as a cure for gonorrhoea.

Arabic: Dokhu, Worga, Worglo—; *Ashkobi*: Azhaum, China—; *Bagwana*: Peonprish—; *Bengal*: China—; *Bihar*: China, Chimb, Chinna—; *Bombay*: Bansi, Chenah, China, Chirwa, Phikar, Rali, Sama, Sawa, Vari, Varikaanu, Varisava, Wadi, Worga—; *Bundelkhand*: Bansi, Phikai, Rali—; *Canarese*: Baragu, Bilibaragu, Karibaragu, Sava—; *Chinese*: Chi, Shu—; *Deccan*: Sava, Sawi, Shamakh, Wari—; *Dutch*: Gierst—; *Egypt*: Dokhn—; *English*: Broom Corn Millet, Chena Millet, Common Millet, Indian Millet—; *French*: Mil, Mil en branches, Mil commun, Mil d'Inde, Petit mil, Millet, Millet commun, Millet à grappes, Millet rond, Millet rouge—; *German*: Hirse—; *Gujerati*: Chino, Samli, Vari—; *Hindi*: Chena, China—; *Iraq*: Dukhn—; *Kashmir*: Chinwa—; *Kila Saifulla*: Azhdan—; *Ladak*: Tzedo—; *Lepcha*: Mung-cher—; *Marathi*: Barag, Sava, Vari—; *North-Western Provinces*: Chehna, Chinwa, Chirwa, Kuri, Sawanchaitwa, Sawanjethwa—; *Persian*: Arzan—; *Portuguese*: Milho miudo—; *Punjab*: Anne, Chena, China, Chini, Salan, Salar—; *Quetta*: Gamh—; *Roumanian*: Malaiu, Meiu—; *Russian*: Proso—; *Sanskrit*: Anu, China, Chini, Rad, Varaka, Vrihibheda—; *Shoran*: Chabor—; *Sind*: Chinu—; *Sinhalese*: Mainairi—; *South Africa*: Indian Buffalo Grass—; *Tamil*: Kadai-kanni, Katakana, Samai, Varagu—; *Telugu*: Barigalu, Varagalu, Warigalu, Worga, Wuragi—; *Tobu*: Azhdun—; *Uriya*: Rala—; *Yemen*: Kossayb, Mileb—.

2. ***Panicum miliare*** Lam. is cultivated or naturalized throughout India and Ceylon. It is cultivated in the tropics.

According to some Ayurveda practitioners the plant acts as a nervine stimulant and tonic.

Bengal: Gondula—; *Bombay*: Badi, Bagad, Burburi, Kulti, Poi, Warai—; *Canarese*: Bilisamai hullu, Shamai—; *Central Provinces*: Chika—; *English*: Little Millet—; *Hasada*: Bicagurulu—; *Hindi*: Kungu, Kutki, Savan—; *Indo-China*: Co gang, Co ong—; *Khond*: Gundli, Pani kuburi—; *Malayalam*: Shama—; *Mundari*: Arabende, Saramecadlongurulu—; *Naguri*: Hendegudulu—; *North-Western Provinces*: Kutki, Mighri—; *Punjab*: Kutki—; *Rajputana*: Nillashama—; *Ranchi*: Mota gundli—; *Santali*: Gundli—; *Sinhalese*: Meneri—;

Tamil: Chamai, Perusamai, Samai, Shamai—; *Telugu*: Chamalu, Gangasamalu, Nallachamalu, Nellashamu, Nellashamalu, Sani, Savai—; *Uriya*: Luniva—.

3. ***Panicum antidotale*** Retz. grows abundantly in the Punjab, the Upper Gangetic Plain, the Western Peninsula and Ceylon. It extends to Afghanistan, Africa and Australia.

The smoke of the burning plant is used for fumigating wounds, also as a disinfectant in small-pox.

In Madras it is given for throat affections.

A report from Hissar states that this grass is grazed only when green, as it afterwards becomes bitter or saltish, and poisonous to cattle.

Baluchi: Bershonk, Gomaz, Gumazg—; *Bombay*: Barigagli, Barn, Barwari, Ghamar, Gharam, Girni, Git, Male, Mangrur, Sera, Shamukha—; *Gujerat*: Dun, Dughas, Dusto—; *Hindi*: Ghemor, Gunara, Jamur—; *Kulanch*: Gomaz—; *Mand*: Dariagi—; *North-Western Provinces*: Gamur, Ghamor—; *Punjab*: Bara, Garm, Ghamrur, Ghamur, Gharam, Ghirri, Girui, Mangrur—; *Pushtu*: Male, Shamukha—; *Rajputana*: Bangagli, Banvari, Gramna—; *Sadani*: Bende—; *Santali*: Layogundli—; *Shakrig*: Gunj—; *Sibi*: Gam—; *Sinhalese*: Krimisastru—; *Tamil*: Nassiampilla, Pinisupilla—.

4. ***Panicum maximum*** Jacq. is a native of Africa, cultivated in many parts of India. It occurs throughout South Africa, the Mascarene Islands, Madagascar and in Yemen. It has been introduced and is widely spread in America.

This grass is considered one of the best horse-fodders, but it may cause fatal colic if given in too large a quantity or when wet.

It is said to be responsible in South Africa for the production of 'dikoor', a disease which affects young sheep, four to twelve months old, which are running on old lands.

Ala: Ikbo mili—; *Brazil*: Capim de Angola, Capim de Colonia—; *Burmese*: Nau-Ka-thau-hau—; *Canarese*: Gini hullu—; *English*: Guinea Grass—; *Ewee*: Kogbe—; *Fanti*: Nykekyer—; *Ga*: Nto—; *Hindi*: Gini ghaus—; *Orange Free State*: Bloussaad—; *Seychelles*: Fataque—; *Sinhalese*: Rataana—; *Southern Nigeria*: Ikbo mili—; *Tamil*: Giniopilla—; *Transvaal*: Buffelgras—.

5. ***Panicum sarmentosum*** Roxb. is found in Assam, Sylhet, Cachar, and the Khasia Hills, ascending to 5,000 ft., Chittagong, and Burma. It is very abundant in the Malay Peninsula in thickets and open edges of woods, often forming great masses scrambling over bushes and ascending to tree-tops. It extends to the Malay islands, Tongking, and China.

In Malaya the roots are chewed with betel nuts as an aphrodisiac.

Malay: Rumpit jangut ali, Rumpit kulubong—.

PASPALUM.

This is a polymorphic genus including over 200 species, scattered through the tropics of both hemispheres, but most abundant in America.

- | | | |
|--|--------|------------------------------|
| 1. Spikelets oblong or lanceolate acute or acuminate. Margin of rachis minutely toothed | ... | 1. <i>P. sanguinale</i> . |
| 11. Spikelets orbicular or broadly oblong. | | |
| a. Spikelets ciliate from the margins of the upper glume | | 2. <i>P. conjugatum</i> . |
| b. Spikelets not ciliate | | 3. <i>P. scrobiculatum</i> . |

1. **Paspalum sanguinale** Lam. is found throughout India, in moist and dry situations, ascending the Himalaya to 6,000 feet. It is cultivated in the Khasia Hills. This grass is one of the commonest weeds in all tropical and warm countries, becoming less frequent in Central Europe.

The plant is known to yield hydrocyanic acid.

Berar: Chikhar.—; *Central Provinces*: Korkoljodi.—; *Egypt*: 'Iraq-en-Najil, Tayyin.—; *Hindi*: Takri, Takria.—; *Khasi*: U'rai-shan.—; *North-Western Provinces*: Charamara, Kewai.—; *Punjab*: Baratakria, Dubra, Farw, Motikhabbal, Takkri.—; *Rajputana*: Hen.—; *Suto*: Mmoyane.—; *Trans-Indus*: Khurash.—; *United States*: Brab Grass.—.

2. **Paspalum conjugatum** Berg. is common in the hotter parts of America from the Gulf States southwards; also in the Indo-Malayan region, Lower and Upper Guinea, and Polynesia.

In some places of the Gold Coast the grass is boiled and used in the bath to cure faintness.

Ashanti: Nsuorhwea.—; *Hawaii*: Hilo Grass.—; *Jamaica*: Sour Grass.—; *Malay*: Rumpit kerbau.—; *Malaya*: Buffalo Grass.—; *Montserrat*: Crab Grass.—; *Sierra Leone*: Yane, Yani.—; *Singapore*: Green Grass.—; *Twi*: Nsoorhwea.—; *West Indies*: Sour Grass.—.

3. **Paspalum scrobiculatum** Linn. is found wild or cultivated throughout the hotter parts of India, from the Punjab eastwards and southwards to Singapore and Ceylon. It is distributed through the Tropics of the Old World.

Ayurveda writers describe the plant as sweetish and bitter, tonic, and antidotal to poisons, useful in the treatment of ulcers; it causes constipation and flatulence, upsets the physiological balance of the body, and leads to hallucinations and dysuria.

Mohammedan authors consider it styptic, useful in inflammation and in diseases of the liver, liable to cause constipation and temperature.

Though used as food by a very large number of people in India, the grain is decidedly a narcotic poison, and its deleterious effects are well known in the various parts of the country where this crop is grown. The symptoms of poisoning resemble those caused by datura, and are more severe in cattle than in man, due no doubt to the animals eating the grain and husk, and also to the absence of vomiting, an effect which almost always takes place in man.

Sushruta prescribes the plant in combination with other drugs for the treatment of scorpion sting, but Caius and Mhaskar have shown experimentally that this grass is not an antidote to scorpion venom.

Australia: Ditch Millet, Hureek.—; *Bengal*: Khodoadhan, Kodoadhan.—; *Bihar*: Koda, Kodai.—; *Bombay*: Harik, Kodra, Kodri, Kodro, Kodroakora, Pakod, Pakodi.—; *Canara*: Arikel, Haraka hullu, Harik.—; *Central Provinces*: Kodie, Kodo.—; *Ceylon*: Koda Millet.—; *Gujerati*: Kodra, Kodro, Meya.—; *Hansa*: Tumbijaki, Tumbin jaki.—; *Hindi*: Koda, Kodaka, Kodava, Kodon.—; *Kolami*: Garakode.—; *Konkani*: Pacodd, Pacoll.—; *Kumaon*: Kodo, Kodra, Kodram.—; *Marathi*: Harik, Kodra, Kodru.—; *Mundari*: Birjane, Loeongjane, Pirijsane, Tasadjane.—; *North-West Provinces*: Koda, Kodon, Kodram.—; *Porebunder*: Kodo.—; *Punjab*: Kodon, Kodra.—; *Sanskrit*: Koddara, Kodrava, Koradusha, Kordrava, Kuddala, Madanagraka, Uddala, Vanakodrava.—; *Santali*: Janhe.—; *Sinhalese*: Amu, Karalamu, Walamu.—; *Southern Nigeria*:

Ikbonta—; *Tagalog*: Paragis, Sabungsabungan—; *Tamil*: Karuvaragu, Varagu, Varaku—; *Telugu*: Allu, Alu, Arikalu, Arike, Arikelu, Aruga, Kiraruga, Nita arigaddi, Patsarige—; *Urdu*: Kodon—; *Urviá*: Khoddi, Kodus—; *Zulu*: isAmuyisane—.

PENNISSETUM.

This genus numbers about 40 species which are found in most warm countries, particularly in dry regions.

| | | | | | |
|-----------|-----|-----|-----|-----|---------------------------|
| Annual | ... | ... | ... | ... | 1. <i>P. spicatum</i> . |
| Perennial | ... | ... | ... | ... | 2. <i>P. compressum</i> . |

1. ***Pennisetum spicatum*** Roem. & Schult. (= *P. typhoideum* Rich.) is cultivated in numerous forms in India, northern and tropical Africa, and southern Europe.

Ayurvedists consider the plant heating, aphrodisiac in women, and tonic; it is useful in diseases of the heart; it improves the appetite for food and the relish of it, but it causes flatulence.

In Guinea the root is reputed toxic to man and animals.

In South Africa the Sutos use the plant as a medicine for cows which have been incompletely delivered at parturition.

Arabic: Dookhr, Duku—; *Ashanti*: Ewio—; *Bihar*: Gahuma, Jondhariya—; *Bombay*: Bajera, Bajra, Bajri—; *Canarese*: Sajje—; *Egypt*: Dok, Hema, Gusab—; *English*: Bulrush Millet, Cumbro Millet, Pearl Millet, Spiked Millet—; *Eritrea*: Bultuc—; *Ewe*: Gbekul, Lu—; *Ga*: Ngma—; *Gambia*: Sannio—; *Hausa*: Damro, Dauro, Gero, Maiwa—; *Hindi*: Bajera, Bajra, Bajri, Kasajonar, Lahra—; *Kolami*: Tuti—; *Krobo*: Ngma—; *Kumaon*: Bajra—; *Malayalam*: Kampam, Mattari—; *Mandingo*: Sannio—; *Matabele*: Um-velli-veli—; *Msutu*: Leeuja—; *North-Western Provinces*: Bajra, Bajra tangunanwa, Bajri, Lahra—; *Nupe*: Gero—; *Punjab*: Bajra, Bajza—; *Rajputana*: Bajra—; *Sanskrit*: Agradhanya, Nali, Nalika, Nilakana, Nilasasya, Sajaka, Varjari, Varjarika—; *Santali*: Lendha—; *Sesuto*: Nyalothie—; *Shahrig*: Bajari—; *Sind*: Bajaro—; *Sudan*: Dukhu—; *Tamil*: Kambu—; *Telugu*: Gantelu, Peddaganti, Sajja, Sajjalu, Sazza—; *Transvaal*: Leeuja—; *Tripoli*: Shessab—; *Urviya*: Bajramula, Gantiva—; *Zambesi*: Mishuera—; *Zanzibar*: Mawali—; *Zulu*: Amabile, Nyaloti, Nyawoti—.

2. ***Pennisetum compressum*** R. Br. (= *P. japonicum* Trin.) is found in Burma, Taong Dong, the Sham Hills up to 4,000 ft. It extends to China, Japan, Tongking and Australia.

This grass is used as a tonic in China.

Chinese: Lang Wei Ts'ao.

PHALARIS.

This genus consists of 10 species, natives of the Mediterranean region, but widely dispersed as weeds; one species occurs in the boreal region and in South Africa, and another is found from California to Chile.

Phalaris arundinacea Linn. is found in Kashmir by the Wolar Lake at an altitude of 5,550 ft. It is fairly common along the pond edges and stream banks, and in wet places in Eastern Washington, but is infrequent in California. It extends to the northern temperate and Arctic regions.

This grass is reported poisonous.

English: Gardeners' Garters—; *Pacific Coast*: Daggars, Reed Cahary-grass, Ribbon-grass—.

PHRAGMITES.

This genus includes 2 species, one cosmopolitan, and one in Argentine.

Phragmites maxima Blatter & McCann (= *P. communis* Trin. = *P. roxburghii* Steud. = *P. karka* Trin.) is cosmopolitan.

Ayurvedists describe the plant as sweet, and acrid, cooling, aphrodisiac; useful in biliousness, urinary troubles, vaginal and uterine complaints, erysipelas, and diseases of the heart.

The root is regarded as cooling and diuretic by the Chinese. It is considered diuretic and sudorific in Spain.

The plant is said to be rich in sugar. A manna, known as California Manna or Father Picolo's Manna, is mentioned as being deposited on the plants growing in California and collected by the Indians. It is believed that the manna is a saccharine deposit caused by aphides.

Arabic: Bus—; *Bengal*: Nal—; *Bihar*: Narkat—; *Burma*: Kaing—; *Cannese*: Hulugalagu, Hulugilahullu, Hulugilu—; *Catalan*: Canya borda, Canya de escumbretas, Canyis, Canyisos—; *Chinese*: Lu—; *Egypt*: Buz haggny, Buz hagny, Ghab, Ghabrihy, Haggny—; *English*: Nodding Reed—; *French*: Cannette, Petit roseau, Roseau à balai, Roseau aquatique, Roseau des marais—; *Garkwal*: Bichhra—; *Gujerati*: Nairi, Nali—; *Hausa*: Machara, Wachiar giwa, Wutsiyar giwa—; *Hindi*: Nainarakula, Nal, Narkul, Nulanara—; *Hova*: Barorata, Katsaoka, Volotara—; *Indo-China*: Kiem, Lo cau, Sai, Say—; *Iraq*: Qasab—; *Irish*: Giokach—; *Italian*: Canela de Ema, Canna palustre, Cannuccia—; *Katagum*: Machara, Wachiar giwa, Wutsiyar giwa—; *Kolami*: Jan-kai—; *Kumaon*: Karka, Khaila, Khailuwa, Nal—; *Lagos*: Ifu—; *Languedoc*: Rouza, Rouzo—; *Loralai*: Nal, Nar—; *Libya*: Buzzam—; *Malay*: Gudabong—; *Malayalam*: Nadam, Nalam, Nannana, Naval—; *Malta*: Common Reed, Spire Reed, Canna di palude, Canna da spazzole, Kasbiet irrih—; *Marathi*: Deonala, Nala—; *Mexico*: Carrizo—; *Pacific Coast*: Common Reed—; *Punjab*: Bagnarri, Dila, Nai, Nal, Nar, Nara, Naria—; *Pushtu*: Drumbi, Dwarena, Ghwarga—; *Roumanian*: Rogoz—; *Sanskrit*: Dhhamana, Nada, Nala, Potagala, Shunya-madhya—; *Shahrig*: Nal—; *Sokoto*: Gabara—; *Spanish*: Cañeta, Garrizo—; *Tagalog*: Tambo—; *Tamil*: Perunanal—; *Telugu*: Kikkasagaddi, Mettantisa, Nagasvaramu, Peddarellu, Puvvuguttigaddi—; *Turkish*: Gamish—; *Uniyoro*: Mataetae—; *Uriya*: Nolo—; *Zhob*: Nal—.

PHYLLOSTACHYS.

This genus consists of about 20 Eastern Asiatic species.

Phyllostachys bambusoides Sieb. & Zucc. is found in Upper Assam on the Mishmi Hills. It inhabits China and Japan.

The plant is much used medicinally in China, where the root is considered tonic and the sprouts parasiticidal. The silicious concretion or *tabashir*, is a demulcent, tonic, aphrodisiac and pectoral, commonly administered in cough, asthma, consumption and fever.

Chinese: Chu, Chu Huang, Chu Sun, Hsien Jen Chang, Kuei Ch'ih, Suan Sun—; *Indo-China*: Son truc, Truc—.

POLYTOCA.

This genus consists of 8 species spread over tropical Asia and Australia.

Polytoca barbata Stapf. is found in the hot and damp parts of India, from the Punjab to Assam and Munneypore, and southwards to Ceylon, extending to Java.

According to Ayurveda the plant is bitter and sweet, tonic, laxative and aphrodisiac. It is reputed useful in strangury, burning sensations, phthisis, vesical calculi, biliousness, diseases of the blood and tendency to hæmorrhage.

Balghat: Kadpi—; *Bengal*: Gurgur, Keshaghansa—; *Canarese*: Kajalu—; *Central Provinces*: Kadpi—; *Chanda*: Kirmagilaramgadi—; *Gond*: Karpia—; *Gujerati*: Kansado—; *Hindi*: Kansa—; *Konkan*: Kasada—; *Marathi*: Kasai, Varival—; *Sanskrit*: Amarapushpaka, Ashvabala, Chamarapusha, Darbhapatraka, Ikshugandha, Ikshura, Ishika, Kanda, Karmamula, Kasekshu, Kasha, Nadeya, Niruja, Potagala, Sharada, Shiri, Sukanda, Vanahasaka—; *Telugu*: Ghellagadi—; *Uriya*: Phultair—.

SACCHARUM.

This genus includes 8 tropical and subtropical species.

- I. Hairs on callus much exceeding the spikelet.
 - Glumes I and II not dorsally villous.
 - a. Culms not leafy above, under .7 in. diameter.
 - Leaves under .8 in. width. Glumes I and II ciliate 1. *S. spontaneum*.
 - b. Culms densely leafy above, over 1 in. diameter. Leaves over 1 in. width. Glumes I and II glabrous 2. *S. officinarum*.
- II. Hairs on callus of sessile spikelet shorter or not much longer than the spikelet. Glumes I and II often dorsally villous. Nodes of culm not bearded. Sheaths not hirsute. Glumes I and II dorsally villous.
 - a. Foliage not glaucous. Culms densely leafy above. Sessile spikelet shorter than internodes 3. *S. arundinaceum*.
 - b. Foliage glaucous. Culms not leafy above. Sessile spikelet longer than internode of rachis 4. *S. munja*.

1. **Saccharum spontaneum** Linn. is found throughout the warmer parts of India and Ceylon, ascending to 6,000 ft. in the Himalaya. It is distributed from the south of Europe to the warm regions of the Old World, and extends to East Australia.

Ayurveda practitioners commonly use this grass as a substitute for *Polytoca barbata* Stapf. Sanskrit authors credit the two plants with the same medicinal properties.

Bombay: Boehri, Dharbi, Dhub, Kan—; *Bengal*: Kagara, Kans, Kas, Kash, Kashiya, Khagra, Khansi—; *Burma*: Thekkaygyee, Thetkiakyn—; *Canarese*: Darbhe, Hodakehullu, Mutollahullu—; *Central Provinces*: Kans, Khan, Padar—; *English*: Thatch Grass, Wild Sugar Cane—; *Gujerat*: Kans, Kansado, Kansadoghas—; *Hasada*: Karetasad, Karitasad—; *Hansa*: Abokin, Kyamo, Kyamo kibiya, Kyamro, Kyauro, Kyauro kibiya, Sheme, Sansari—; *Hindi*: Kagara, Kans, Kas, Khansi, Khugura, Kosa, Kus—; *Kolami*: Puyal—; *Kumaon*: Jasha, Jhaush, Kash—; *Lao*: Pong—; *Lepcha*: Brung—; *Malayalam*: Nannana—; *Marathi*: Kagara, Kas—; *Mundari*: Kariba—; *Naguri*: Kasitasad—; *North-Western Provinces*: Kans, Kansa, Kansi—; *Oudh*: Khagar, Rara—; *Punjab*: Kahi, Kanh, Kans, Sarkara—; *Rajputana*: Kans, Kash, Kashi—; *Sarani*: Kasighas—; *Sanskrit*: Ikshugandha, Kasa, Kahsa, Khaggara—; *Sind*: Kahu, Khan, Khau—; *Tamil*: Achabaram, Anjani, Eruvai, Kosangam, Kucham, Kumil, Kurbagam, Nanal, Nanarbul, Nanmugappul, Peykkarumbu,

Sangabidam, Saravanam, Sarupparasi, Sasabaram, Sugattan, Suvedasaram, Tittiruchi, Tuttam, Vedasam—; *Telugu*: Billugaddi, Kakicheraku, Kaki-veduru, Koregadi, Rasalamu, Rellugaddi, Vetticharaku—; *Uriya*: Chhataiagaso, Inkoro, Kaso, Khhodi, Pothhorokkhodi—.

2. **Saccharum officinarum** Linn., probably a native of South Asia, is grown everywhere in India.

Ayurveda describes the sugar cane as sweet, oleagenous, diuretic, tonic, cooling and aphrodisiac. It recommends it as a useful remedy in fatigue, thirst, intestinal troubles, anaemia, erysipelas and leprosy. The cane, however, is indigestible, and likely to interfere with the heat factor in the body causing inflammations and ulcers.

Yunani describes the cane as sweet, laxative, diuretic, fattening and aphrodisiac. It considers it useful to purify the blood, good for the lungs, but bad for the liver.

The roots are used as a cooling and diuretic medicine; and the stem is said to be useful as a remedy for cough.

Sugar cane enters into the composition of Cambodian medicines used for the treatment of ulcers of the skin and mucous membranes. A decoction of the stem is given in diarrhoeas of childhood.

The sugar cane is recognised in Portugal, Spain, Switzerland and the United States as the officinal source of sucrose or saccharose.

The Hindus set a great value upon sugar, and in medicine it is considered by them as nutritious, pectoral and anthelmintic.

In Arabian works on *Materia Medica*, sugar is described as detergent and emollient. Many writers speak of it as attenuant and pectoral. It has also been supposed to have virtues in calculus complaints.

In the Punjab sugar is considered heavy, tonic and aperient, useful in heat delirium and disorders of the bile and wind.

In cases of poisoning by copper, arsenic, or corrosive sublimate, sugar has been successfully employed as an antidote; and white sugar finely pulverised is occasionally sprinkled upon ulcers with unhealthy granulation.

The root, the bark, the stem and the leaf, treacle and sugar, have all been boomed as snake-bite remedies. Mhaskar and Caius have, however, shown experimentally that, whether administered internally or applied externally, every part of the sugar cane is useless in the treatment of snake-bite.

Ada: Afunu—; *Annam*: Mia—; *Arabic*: Kasabishakar, Kasibshakar, Qasabussakar—; *Atina*: Fofongu—; *Behar*: Katari, Ketari, Khusiya, Ukh, Ukh, Ukhi—; *Bengal*: Ak, Ganna, Ik, Kajuli, Kulluar, Kushiar, Puri, Uk, Ukyo—; *Bombay*: Ganderi, Gol, Serdi, Us—; *Brazil*: Canna, Canna de assucar, Tacomaree, Viba—; *Burma*: Keyan, Kyan—; *Cagayan*: Agbo—; *Cambodia*: Ampou, Ampou—; *Canarese*: Ikshu, Ikshudanda, Ingolu, Kabbu, Kantara, Kantaraka, Madhura, Marakabbu, Pundra, Rasadali, Rasala, Rastale, Tanigarbu, Trinaraja—; *Catalan*: Cana dolsa, Cana de sucra—; *Ceylon*: Karambu—; *Chinese*: Kan Che, Sha T'ang, Shih Mi—; *Cochin China*: Mia—; *Deccan*: Ganda, Us—; *Dutch*: Suiker riet—; *Easter Island*: To—; *Egypt*: Ghah, Qassab sukkar—; *English*: Sugar Cane—; *Ewe*: Fofongu, Bogleng—; *Fanti*: Ahwerenkakraba—; *Fiji*: Dovu, Vico—; *French*: Canamelle, Cannamelle, Canne de Batavia, Canne de la Chine, Canne d'Haïti, Canne à sucre, Roseau

à sucre—; *French Guiana*: Canne à sucre—; *Ga*: Sheng—; *German*: Zuckerrohr—; *Guam*: Tupo, Tupo—; *Gujerati*: Naisakar, Serdi, Sheradi, Sberdi, Uns—; *Gulf States*: Ribbon Cane, Sugar Cane—; *Hausa*: Deke, Karansariki, Rake—; *Hindi*: Ganna, Ikh, Kajuli, Khulua, Kumad, Naishakar, Rikhu, Uk, Ukh—; *Hova*: Fary—; *Iraq*: Qasab sukkari—; *Japanese*: Kansia—; *Java*: Tebu—; *Kano*: Rake—; *Konkani*: Uny, Uss—; *Krepi*: Bogleng, Boglengbiei, Boglengfe, Boglengyibor—; *Korbo*: Ahleu—; *Kumaon*: Rikhu—; *Kurdish*: Gamish-i-shikir—; *La Reunion*: Canne—; *Madagascar*: Fary—; *Malay*: Tebu, Tibu mira, Tebu—; *Malayalam*: Darbheshu, Ikshu, Kantarakam, Karimpu, Madhutrinam, Vellakarimpu—; *Marathi*: Aos, Kabbo, Us, Usa—; *Mundari*: Gurdanda, Garkatauri, Gurkosear—; *Nepal*: Akali, Chaku, Uk—; *Newar*: Tu—; *New Caledonia*: Ariva, Arolam, Boiepe, Boinlousa, Delenole, Dilou, Dogangueni, Gadenadeboni, Goreate, Jate, Kabopolenouen, Kiaboue, Kinemaite, Kondimoua, Koubala, Maiou, Mebouangue, Mengou, Migao, Moene, Moindiene, Moucouete, Ngala, Niemba, Ouali, Ouane, Oudiepe-ait, Ouen, Ouen ebail, Ouen mangia, Ouen ou poudendate, Paimbou, Paieme, Pidiak, Pobone, Poilote, Schimate, Sthiabanghi, Tangalite, Tbsiogon, Tilibi, Tshiambo—; *North-West Provinces*: Ganna, Ikh, Ikhari, Kanthirikhu, Punarikhu, Rikhu, Ukh, Ukhari—; *Parbuttiak*: Ghenra—; *Persian*: Naishakar—; *Philippines*: Tubo—; *Portuguese*: Canna de assucar, Canna doce—; *Punjab*: Canna, Ikh, Kamad, Kamand, Khand, Paunda, Shakarsurkh—; *Roumanian*: Trestie de zahar—; *Russian*: Saharnyi trastnik—; *Sakalace*: Fisika—; *Samoa*: Tolo—; *Sanskrit*: Adhipatra, Asipatra, Bhurirassa, Dirghachhada, Gandidi, Gudada, Gudadaru, Gudakashtha, Gudamula, Gudatrina, Ikshu, Ikshura, Kantara, Kantaraka, Kartotake, Khadgapatraka, Koshakara, Madhutrina, Madhuyashit, Maharasa, Mriyupushpa, Payodhara, Pundraka, Rasala, Rasalu, Sastra, Sukumasaka, Trinadhya, Vansha, Vipularasa, Vrishya—; *Santali*: Akh, Ikshu—; *Sind*: Kamand—; *Sinhalese*: Uk, Ukgas—; *Sokoto*: Arakke—; *Spanish*: Caña de azucar, Caña dulce, Cañamiel—; *Tagalog*: Tubo—; *Tahiti*: To—; *Tamil*: Angarigai, Asibattirgam, Ikku, Kalai, Kannal, Karumbu, Madudirunam, Paruvayoni, Pundaram, Ukkiragandam, Ukkiragandi, Velam, Vengarumbu—; *Telugu*: Arokanupulakranuga, Cheraku, Cherakubhedamu, Cherakubodi, Chera-kudubu, Ikshupu, Inju, Kantaramu, Kanupulacheraku, Lavucheraku, Pottikamucheraku, Tellacheraku, Tiyyamranu, Tunta, Vamsukamu—; *Tongking*: Mia, Mia co ke, Mia lau, Mia ly—; *Tulu*: Karumbu—; *Twi*: Ahwereu—; *Urdu*: Cana—; *Uriya*: Aku, Gudodaru, Ikhyu—; *Visayan*: Quilaba—; *Yemen*: Mud-dardjend—.

3. *Saccharum arundinaceum* Retz. is found throughout the plains and low hills of India, extending into China.

The root is demulcent and diuretic.

Bengal: Teng—; *Burma*: Phoungga—; *Canarese*: Abbe, Baragu, Hodakai hullu, Lekhimihullu, Munja, Munji, Nala, Rellu, Sara—; *Ceylon*: Elephant Grass—; *English*: Devil Sugar Cane, Reedy Sugar Cane, Wild Sugar Cane—; *Malaya*: Elephant Grass, Tebrau—; *Malayalam*: Mekhalapullu, Munja, Sarappullu—; *Punjab*: Sarkanda—; *Rajputana*: Sarpat—; *Sanskrit*: Gundra, Munja, Sara, Tejanaka—; *Sinhalese*: Rambuk—; *Tamil*: Elhadugirananal, Munji, Pi karumbu—; *Telugu*: Adavicheruku, Bramhamekhalamu, Gundra, Kondakanamu, Munjagaddi, Mungamu, Nadamu, Polagaddi, Ponika, Ponugu, Saramu—; *Uriya*: Kantosoro, Soro—.

4. *Saccharum munja* Roxb. (= *S. ciliare* Anders.) is abundant over the greater part of North-West India, especially in the Punjab, extending to the Upper Gangetic Plain.

Ayurveda describes the stem as sweet and acrid, cooling, and aphrodisiac; useful in thirst, burning sensations, erysipelas, diseases of the blood, urinary complaints, and eye troubles.

In the Punjab the root is burnt near women after delivery, its smoke being considered beneficial. The root is also used as a fumigant for burns and scalds.

Ajmere: Sara, Sarpat—; *Bengal*: Mucha, Ramshara, Sar, Sara, Sarpata, Shar—; *Bolan River*: Kash—; *Bombay*: Kerpa, Munj, Sar—; *English*: Munj

Grass—; *Hasada*: Mail—; *Hindi*: Munj, Munja, Ramsar, Sara, Sarkanda, Sarkara, Sarpat, Sarpatta—; *Marathi*: Mole—; *Mundari*: Hatumail—; *Naguri*: Mahil—; *North-West Provinces*: Ikar, Patawar, Sarbar, Sarkanda—; *Oudh*: Palwa—; *Pishin*: Surghashae—; *Punjab*: Kanda, Kharkana, Sarjbar, Sarkara—; *Quetta*: Surghashae—; *Sanskrit*: Bahupraja, Bana, Bhadramunja, Brahmanya, Chakshuvestana, Darbhavhaya, Dridhatrina, Durmula, Ikshukanda, Maunji, Munja, Munjanaka, Munjata, Ranjana, Shkrabhanga, Shara, Shiri, Sthuladarbha, Sumekhala, Tejana, Tejanavhaya, Trinakhya, Vaniraka—; *Santali*: Sar—; *Telugu*: Gundra, Ponika—; *Tharu*: Kandikhar, Karai—; *Trans-Indur*: Darga, Karre—; *Turbat*: Dil—.

SETARIA.

This genus numbers about 100 species, found in tropical and warm temperate regions.

S. italica Beauv. and *S. viridis* Beauv. are used medicinally in China; *S. plicata* T. Cooke in La Reunion; *S. sulcata* Raddi in Zululand.

- | | |
|---|------------------------|
| I. Leaves more or less plicate. Perennial. Culm reaching 5 ft. | 1. <i>S. plicata</i> . |
| II. Leaves flat, not plicate. | |
| a. Culm 2-5 ft. high | 2. <i>S. italica</i> . |
| b. Stem 1-2 ft. high | 3. <i>S. viridis</i> . |

1. **Setaria plicata** T. Cooke is found throughout the moister hilly parts of India, from Kumaon in the Himalaya eastwards, ascending to 5,000 ft. in Sikkim, the Shan Hills in Burma, the Nilgiris up to 6,000 ft., the Malay Peninsula, and Ceylon. It extends to the Malay Islands and China.

The plant is used in La Reunion as an emollient diuretic.

La Reunion: Trainasse—; *Malay*: Akar pimpan—.

2. **Setaria italica** Beauv. is cultivated throughout India, and up to 6,000 ft. in the Himalaya. It is found in most warm, temperate and tropical countries.

According to Ayurvedic texts the plant is sweet and acrid, fattening, aphrodisiac, and sedative to the gravid uterus. It is useful in dispelling burning sensations, and in healing fractures. It produces flatulence.

It is a popular domestic remedy for alleviating rheumatic pains and the pains of parturition.

The grain is said to act as a diuretic and astringent, and to be of use externally in rheumatism.

When taken as the sole food Indian Millet is sometimes apt to produce diarrhoea. It has long been regarded as unsatisfactory for horses unless fed sparingly.

Andamans: Tanahal—; *Arabic*: Dukhu—; *Bengal*: Bertia, Chena, Kakni, Kakun, Kangu, Kauni, Kirakang, Kirang, Kora, Rala, Rawla, Tangan—; *Bombay*: Kakun, Kang, Kangu, Korakang, Korakangu, Vavani—; *Bonai*: Kango—; *Bundelkhand*: Kakun—; *Burma*: Paki, Pyounglaykonk, Zami—; *Canarese*: Karibiragu, Naoni, Navanai, Navani, Vavani—; *Catalan*: Cúa de guilla, Cúa de guinea, Panis, Panissa—; *Cebu*: Mijo—; *Central Provinces*: Kungni, Rala—; *Chinese*: Liang, Shu, Su—; *Cochin China*: Cay khe—; *Deccan*: Bertia, Chena, Kakni, Kakun, Kangu, Kauni, Kirakang, Kiranj, Kora, Rala, Rawla, Tangan—; *English*: Boer Manna, Foxtail Millet, Hungarian Grass, Italian Millet, Millet—; *French*: Mil à épi, Mil d'Italie, Millet en épi, Millet des oiseaux, Panis d'Italie, Panouil, Panouque, Penille—; *Gujerati*: Kang, Karang—; *Hindi*: Bertia, Chena, Kakni, Kakun,

Kalakangni, Kanghuni, Kangni, Kangu, Kauni, Kirakang, Kiranj, Koni, Kora, Rala, Rawla, Tangan—; *Ilocano*: Bicacao, Bucacao—; *Iraq*: Dukhn—; *Italian*: Panico—; *Kashmir*: Pingi, Shali—; *Khasi*: U'rai-shoh—; *Kolami*: Haraba, Marang Kukru—; *Khondmals*: Arga—; *Konkani*: Kangu—; *Kumaon*: China, Gandra, Kangni, Koni, Mandira, Mandua, Murhoa, Shungura—; *Lynn-gam*: Jrai—; *Malay*: Iskoi—; *Malayalam*: Navana, Tauna, Tena—; *Malta*: Italian Millet, Panico—; *Marathi*: Chenna, Kang, Kangu, Rala, Bale—; *Mundari*: Irba—; *North-Western Provinces*: Kangni, Tangun—; *Pampangan*: Borona—; *Persian*: Arzun, Gal—; *Punjab*: Chanwalkangni, Chiurr, Gal, Huskelkangni, Kangni, Khauni, Kher, Kusht, Shak, Shali—; *Pushtu*: Gal—; *Sanskrit*: Chinaka, Kangu, Kanguni, Kangunika, Pitatandula, Priyangu—; *Santali*: Erba—; *Sema*: Asuh—; *Sind*: Kirang—; *Sinhalese*: Tanahal—; *Spanish*: Mijo menor, Panizo—; *Tagalog*: Dava, Dava—; *Tamil*: Tenai, Tennai—; *Telugu*: Kora, Koralu—; *Uriya*: Kangu, Tangun—; *Visayan*: Daqa, Dava—.

3. *Setaria viridis* Beauv. is found in temperate Himalaya and Western Tibet, ascending to 11,000 ft.; but it is in no way common anywhere. It is also rare on the plains of India. It has been reported from the Nilgiri Hills. It is distributed throughout the temperate and subtropical regions of the Old World.

The plant, crushed and mixed with water, is used in China as an external application for bruises.

Chinese: Kou Wei Ts'ao—.

SORGHUM.

This genus consists of about 35 species spontaneous in the tropical and subtropical regions of both hemispheres, very few extending into the temperate zone. One group of forms is widely cultivated in the tropics, particularly in Africa and India.

A form of *S. guineense* Stapf. is grown for medicine in Upper Guinea; its grain is said to give colic to animals.

| | | | | | |
|-----------|-----|-----|-----|-----|--------------------------|
| Perennial | ... | ... | ... | ... | 1. <i>S. halepense</i> . |
| Annual | ... | ... | ... | ... | 2. <i>S. vulgare</i> . |

1. *Sorghum halepense* Pers. (= *Andropogon halepensis* Brot.) is common all over India, Burma and Ceylon in cultivated and uncultivated ground. It is distributed over most warm countries.

The seeds are demulcent and diuretic.

The grass is a good fodder both for grazing and for hay, but it is held to have injurious effects if eaten when too young or when the plants are stunted by drought. It has been reported from the Punjab that cattle after eating it had developed fatal head affections; and reports from various parts of Iraq indicate that the plant may cause the death of sheep or goats. This property is also well known in Australia, the United States of America and many other countries.

Banda: Bajra, Bara, Barra—; *Bengal*: Kalamucha—; *Berar*: Kartal—; *Bhabar*: Bura, Rikhon—; *Bombay*: Bara, Barra, Batal, Dacle, Kartal—; *California*: Arabian Millet, Evergreen, Means Grass, Millet—; *Canarese*: Kadukambu-hulla—; *Ceylon*: Johnson-weed, Sorghum-weed—; *Chanda*: Gallajari, Gudi, Paddajalla—; *Egypt*: Gerraou, Hashish-el-faras—; *English*: Aleppo Grass, Evergreen Millet—; *French*: Herbe de Para—; *Greek*: Kalamagra—; *Hindi*: Baru—; *Iraq*: Halaiyan, Sifrand—; *Kashmir*: Braham—; *Kohlu*: Baran—; *Kumaon*: Bikhonda—; *Malta*: Aleppo Millet-grass, Cannarecchia, Dente cavallino—; *Merwara*: Bowari—; *Punjab*: Baru, Barwa, Braham—; *Pushtu*:

Barua—; *Sakalace*: Fembamboloky—; *Shahrig*: Baran—; *South Africa*: Cuba Grass, Johnson Grass—; *Tamil*: Kadu cholam—; *Telugu*: Gaddijanu—; *United States*: Cuba Grass, False Guinea Grass, Johnson's Grass, Mean's Grass, Mears Grass—; *Uruguay*: Gramillon, Pato ruso, Sorgo de Alepo—.

2. **Sorghum vulgare** Pers. (= *Andropogon Sorghum* Brot.) is widely cultivated in India. It is cultivated in numberless forms in the tropical and subtropical regions, particularly in the Old World, and in the warmer parts of the temperate zones of both hemispheres.

According to Ayurveda writers the grain is cooling, and aphrodisiac, improving both appetite and relish for food. It is useful in the treatment of general disorders, diseases of the blood, piles, ulcers, tumours. It is highly indigestible, and causes constipation.

The seeds are diuretic and demulcent.

American Negroes like the decoction of the seeds as a remedy for urinary, bladder and kidney, complaints.

The adventitious shoots growing out of derelict stumps are fatal to cows and goats. In Guranjwala, Gujerat, and Shahpur districts, it is said to be poisonous until the rains are over, when the cattle eat it with impunity.

Afghanistan: Jaor, Jaoriturkimani, Jawars, Jowar, Kiosagi—; *Arabic*: Dakkn, Dhura, Dhurat, Jawars, Taam, Zura—; *Ashanti*: Atokoor—; *Babian Shahrig*: Jowari, Targhar—; *Baghwana*: Dhutar, Turi—; *Bengal*: Jowar, Juar, Kasajonar, Kurbi—; *Betsileo*: Variampemby, Varifemba—; *Bhabar*: Juali—; *Bombay*: Burru, Jaundri, Joar, Jondla, Jowari, Kangra—; *Burma*: Pyoung—; *Canarese*: Jolah, Kenjol, Nirgol, Shalu, Yengara—; *Catalan*: Melca, Menea, Mill africá—; *Central Provinces*: Jowar, Phag, Thuthera—; *Ceylon*: Cholun, Durra, Great Millet, Guinea Corn—; *Chinese*: Kao Liang, Shu Shu—; *Deccan*: Jondla, Jowari—; *Egypt*: Dokhn, Dura, Dura-belledi, Durra, Kaydi—; *English*: Broom-corn, Guinea Corn, Great Millet, Indian Millet—; *Ewe*: Fo—; *French*: Balai, Balai de jonc, Balai d'eau, Blé de Guinée, Houque à balais, Maïs de Guinée, Mil d'Italie, Mil d'Inde, Millet d'Afrique, Millet à balais, Grand Millet noir, Millet de Turquie, Gros mil, Mil d'Ethiopie, Sorgho, Sorgho d'Afrique, Sorgho à balai, Sorgho commun—; *Ga*: Akoko—; *Gambia*: Bassiqui, Bassiwultima, Kous, Manio—; *German*: Moorhirse, Sorghum—; *Gold Coast*: Guinea Corn—; *Gujerati*: Jowar, Juar, Sundia—; *Hindi*: Janera, Joar, Jondla, Jowari, Juar, Jundri, Juarijondhla, Kangguni—; *Hora*: Ampemby—; *Iraq*: Dhurah, Idhrah baidha—; *Khasi*: U Krai—; *Kolami*: Gangai—; *Konkani*: Juar—; *Krepi*: Fo—; *Krobo*: Koko—; *Kumaon*: Jowar, Juali—; *Kurdish*: Zurat spi—; *Languedoc*: Millangue, Millanque—; *Lao*: Ya pong—; *Las Bela*: Jowari—; *Lepcha*: Ra-Kong, Tsung-Kong—; *Makran*: Mohammdisa, Sobro—; *Malayalam*: Chavela—; *Mal Paharia*: Sissua—; *Malta*: Dariseed, Durrah, Karaboc, Melica, Saggiwa—; *Marathi*: Jondhala, Juari, Kadval, Shalu—; *Mundari*: Gangae, Ganggai—; *North-West Provinces*: Bajrahopanwa, Chotijuar, Juar, Junri—; *Oudh*: Bajrahopanwa, Chotijuar, Juar, Junri—; *Portuguese*: Milho—; *Punjab*: Bajrahopanwa, Chari, Chotijuar, Chotijunri, Joar, Junri, Ka—; *Russian*: Sorgo—; *Sakalace*: Bakaka, Morama—; *Sanskrit*: Dirghanala, Dirghashara, Ikshupatraka, Kshetrekshu, Raktakhumab, Shikhari, Vrittastandula, Yavanala—; *Santali*: Juar—; *Sarakhala*: Tarighara—; *Sema*: Atsunáki—; *Sinhalese*: Karalirungu—; *South Africa*: Kaffir Corn, Kafir Corn—; *Spanish*: Alcandia, Saina—; *Tamil*: Cholun—; *Telugu*: Bondajanu, Janu, Jonna, Jonnalu, Kondajano, Tellajanu—; *Turkish*: Baiyadh dari—; *Twi*: Atoko, Awi, Kokorte—; *Uruguay*: Maiz de Guinea, Sorgo—; *Visayan*: Batad—; *Zulu*: Amabele, Imfe—.

STENOTAPHRUM.

This genus consists of 7 species, found mainly on the shores of the tropical and subtropical seas, four being confined to Madagascar and the neighbouring islands.

Stenotaphrum glabrum Trin. occurs in the plains throughout India. It is found in Lower and Upper Guinea, also in South Africa from Cape Town to Natal, on the American shores of the Atlantic from South Carolina to the La Plata and in the Pacific from Southern Mexico to Australia. It has been introduced in Southern France and Italy.

The rhizome is diuretic, and the decoction is used in Brazil as a diuretic and sudorific.

America: St. Augustine Grass—; *Australia*: Buffalo Grass—; *Bahia*: Grama da Praya—; *Bermuda*: Crab Grass—; *Florida*: Mission Grass—; *Jamaica*: Pimentó Grass—; *La Reunion*: Chiendent de boeuf—; *Mauritius*: Herbe bourrique—; *Natal*: Tweek Grass—; *St. Helena*: English Wire Grass, Mat Grass—; *Transvaal*: Tweek Grass—.

STIPA.

This is a genus of over 100 species, spread over the temperate and tropical regions of both hemispheres.

S. inebrians Hance, *S. sibirica* Lam., and *S. viridula* Trin. are actively poisonous; *S. vaseyi* Scribner is a very active narcotic.

- | | | | |
|---|-----|-----|--------------------------|
| I. Leaves smooth; ligule oblong. Callus short, conical. Anther-tips bearded | ... | ... | 1. <i>S. sibirica</i> . |
| II. Leaves scaberulous; ligule lanceolate. Callus scabrid, top bearded. Anther-tips naked | ... | ... | 2. <i>S. capillata</i> . |

1. **Stipa sibirica** Lam. is found in the Western temperate Himalaya, from Kashmir to Kunawar up to 8,000-9,000 ft. altitude, and to the Black Mountains. It extends to Afghanistan, Siberia and Korea.

This grass is actively poisonous and is reported to have caused death in horses and other domestic animals.

2. **Stipa capillata** Trin. is found in Western Himalaya, ascending up to 11,000 ft. in Kashmir. It extends westwards to Spain, Dahuria, China.

This grass frequently kills sheep, not, however, by a direct poisonous action, but by its glumes working through the skin into the vital organs.

THELEPOGON.

The one representative of this genus, **T. elegans** Roth., occurs in Central India, the Konkan and Malabar, extending to tropical Africa.

In Northern Nigeria it is fed to horses as a tonic. It is described as very bitter.

Hansa: Dataniya, Dwatana—; *Katagum*: Dandata—.

THEMEDA.

This genus numbers about 15-16 species, all natives of the tropical and subtropical regions of the Old World, mostly Indo-Malayan.

Themeda triandra Forsk. is found in the hotter drier parts of India, from Upper Bengal to Travancore, ascending the Himalaya to 3,000-4,000 ft. It also occurs in Burma and Ceylon, ascending to 4,000 ft. It is one of the commonest grasses of

the drier regions of Africa, often forming extensive associations. It extends to Australia and all the warm regions of the Old World.

This plant is said to be used medicinally in China. It has been found to yield hydrocyanic acid.

Canarese: Bettanchi hullu, Gondamanchi hullu, Thodda anji hullu—; *Indo-China*: Quan—; *Natal*: Insinda—; *South Africa*: Rooi Grass—; *Tamil*: Erigai thattu pullu—.

THYSANOLAENA.

T. procera Mez. (= *T. agrostis* Nees = *T. acarifera* Nees and Arnot.), the only species of this genus, is found in subtropical Himalaya, from Kumaon eastwards and the Khasia Hills at altitudes of 4,000-5,000 ft., in Behar on the Parasnath, in the Deccan, Burma, Nicobar Islands, and the Malay Peninsula, where it abounds in dry banks in the hills at 1,000 ft. altitude and upwards from Penang to Malacca. It extends eastwards to New Guinea.

A decoction of the root is used in Chota Nagpur as a mouth-wash during fever.

Birja: Jopono—; *Gond*: Phulbari—; *Hasada*: Durhitasad, Duritasad—; *Indo-China*: Dong trung ha thao, Dot, Le, Ong anh, Xay—; *Khond*: Sadari, Saperi—; *Kolam*: Dodri, Gara-jonor—; *Malay*: Buluh tubaro—; *Mundari*: Garajapono, Garajono—; *Naguri*: Durhitasad—; *Santali*: Bushnia, Karsar—; *Saora*: Kondachipuru—; *Uriya*: Phulosoro—.

TRITICUM.

This genus consists of 20 species, natives of the Mediterranean region and of Western Asia.

T. aestivum Linn. is used medicinally in Europe, and three of its races—*T. amylicum* Ser., *T. durum* Desf., *T. spelta* Linn.—are used as tonics in Brazil.

Triticum aestivum Linn. (= *T. sativum* Lam.) is cultivated in many parts of Northern India and the Deccan Peninsula, especially in the North-West, and up to 13,000 ft. in the Himalaya and Tibet.

Ayurveda writers describe wheat as cooling, oleagenous, tonic, aphrodisiac, laxative, and fattening, improving appetite and relish for food. They held it as a useful medicine in general disorders of health; but they admitted that it was hard to digest.

'The fine floure', says Gerard, 'mixed with the yolke of an egge, honey and a little saffron, doth draw and heale byles and such like sores, in children and in old people, very well and quickly. . . . Slices of fine white bread laid to infuse or steepe in Rose water, and so applied unto sore eyes which have many hot humours falling into them, doe easily defend the humour, and cease the paine. The oyle of wheat pressed forth between two plates of hot iron, healeth the chaps and chinks of the hands, feet and fundament, which come of cold, making smooth the hands, face or any other part of the body.'

And Culpeper: 'The oil pressed from wheat by means of plates of iron or copper, heals tetters and ringworms, if used warm. The green corns chewed, and applied to the bites of mad dogs, heals them; wheat-bread poultices made with red wine, and

applied to hot, inflamed, or blood-shot eyes, helps them. Hot bread poultices applied three days together, heals Kernels in the throat. Wheat flour mixed with juice of henbane stays the flux of humours to the joints, if laid thereto; or mixed with the yolk of an egg, honey or turpentine, draws, cleanses, and heals boils, plague sores, or foul ulcers. It is more useful for food than medicine; though a poultice made of it with milk, easeth pains, ripens tumours and imposthumations; and a piece of toasted bread dipped in wine, and applied to the stomach, is good to stay vomiting.

Wheaten flour, bran, starch, and bread-crumbr are still very much in demand as popular medicines in Europe and in all places inhabited by European settlers or their descendants.

The flour, which is officinal in France, is esteemed as an external application in erysipelas, burns, scalds, and various itching and burning eruptions. A mixture of flour and water is used as an antidote in cases of poisoning by salts of mercury, copper, zinc, silver and tin, and by iodine.

Bread is formed by making flour into a paste with water, with the addition of yeast, setting it aside to ferment, and then exposing it to the heat of an oven. A poultice is often made by boiling bread with milk; its effects are similar to those of a flax-seed poultice although it does not hold the heat so well. Bread-crumbr is useful for giving bulk to pills, and for making poultices.

Bran is laxative, and may be used with advantage to prevent costiveness. Bran bread made from the unsifted flour, is an excellent laxative article of diet in some dyspeptic cases, and, owing to its freedom from starch, in diabetes. Bran poultices are useful for many purposes. Bran is sometimes used in the form of a decoction or infusion, as an emollient bath, and also internally as a demulcent.

Starch prepared from wheaten flour is officinal in all pharmacopoeias. It is employed for sprinkling over inflamed surfaces, to absorb acid secretions, and prevent excoriation. Mucilage of starch is valued in pharmacy for many purposes, and medicinally as a demulcent. In surgery it is occasionally employed for stiffening bandages.

Gluten is a term popularly known in connection with the names of 'gluten flour' and 'gluten bread', used and recommended especially in connection with the dietary of diabetics when starchy foods are to be administered in small amounts or altogether prohibited. These preparations are legion and in many instances are sold under claims which are as false and misleading as they are cruel in the hope of which they hold out to the sufferer from the disease.

In China the grains are roasted and are considered useful in colliquative sweating, especially in tuberculosis in women.

Afghanistan: Ganam, Gandam—; *Afrikaans*: Koring—; *Arabic*: Burr, Hintah—; *Ashkobi*: Spinghanam, Wasaghanam—; *Bagwana*: Davak, Kandahari, Kub, Shorawaki, Shuthardandan, Sundia, Trinali—; *Bengal*: Gam, Giun, Gom—; *Bombay*: Gahu, Ghawn, Ghawutghum, Giun, Gohum, Kapale, Marghum—; *Brazil*: Trigo, Trigo candéal, Trigo tremez—; *Burma*: Gyonsaba Gyungsaba—; *Canarese*: Godhi—; *Catalan*: Blat menut, Xeixa, Xexa—;

Central Provinces: Ghobot, Seonikar—; *Chinese*: Ch'ao, Cheng Ping, Chiang, Hsiao Mai—; *Deccan*: Gohun—; *Dutch*: Tarwe—; *English*: Wheat—; *French*: Blé, Blé cultivé, Blé marcel, Blé marcelet, Blé de mars, Blé d'été, Blé trémois, Froment, Froment cultivé—; *German*: Weizen—; *Greek*: Sitari—; *Gujerati*: Gawn, Ghavum, Govum—; *Hadramaut*: Burr—; *Harboi Hills*: Ghanam, Kholam, Shirukh—; *Hansa*: Alkama—; *Hindi*: Gehub, Gehun, Giun, Kunak—; *Hova*: Lafarina, Varimbazaba—; *Hungarian*: Buza—; *Italian*: Frumento, Grano—; *Jhalawan*: Geroli, Sundia—; *Kharan*: Pashmik—; *Khuzdar*: Geroli—; *Kila Saifulla*: Ghanam, Saighanam, Spinghanam—; *Kirta*: Barkhani, Sungsillah—; *Konkani*: Gahum—; *Languedoc*: Blad, Bladet, Blat, Bled—; *Malayalam*: Gendum, Kotanpam—; *Malta*: Spring Wheat, Grano d'estate, Marzuolo, Civitella, Tomnija—; *Marathi*: Gahum, Gahung—; *Mastung*: Ghanam, Kholam—; *Michi*: Shruk, Tokar, Tomar, Tro—; *Nigeria*: Common Wheat, Egyptian Wheat, Miracle Wheat, Muminy Wheat, Wheat—; *North-Western Provinces*: Gehun—; *Oudh*: Gehun—; *Pab*: Khisankah—; *Persian*: Gandum—; *Portuguese*: Trigo—; *Punjab*: Do, Dro, Gehun, Kanak, Nis, Rozatt, To, Zud—; *Quetta*: Pashmik—; *Roumanian*: Griu—; *Russian*: Pshenitza—; *Sadani*: Gehom, Gohom, Gom—; *Sanskrit*: Arupa, Bahudugdha, Godhuma, Kshiri, Mlenchbabhojana, Nistusha, Rasala, Saman, Sumana, Yava, Yavana—; *Saruna*: Khalam—; *Shahrig*: Boja, Gandun, Ghanam, Kholam—; *Sinhalese*: Tiringu—; *Sohrab*: Pesur, Puzho, Shubhardandan—; *Spanish*: Trigo candeal, Trigo chamorro, Trigo común, Trigo jejar, Trigo marzal—; *Tamil*: Godumai, Godumbaiyarisi—; *Teluga*: Godumulu—; *Wad*: Sundia—; *Zulu*: uKolo, uKolweni—.

a. *Triticum durum* Desf.—*Portuguese*: Trigo durasio—.

b. *Triticum spelta* Linn.—; *Arabic*: Hunta, Qamh, Qamh m'ghejir, Qamh ne ejghe, Qamh stejri—; *Catalan*: Escanya major, Espelta—; *Egypt*: Hunta Qamh—; *French*: Ampeutre, Engrain, Froment rouge, Grande épeautre, In-grain—; *Spanish*: Escanda, Espelta—.

c. *Triticum amyleum* Ser.—*Brazil*: Trigo branco—.

VETIVERIA.

This genus consists of 7 species, distributed throughout the tropics of the Old World; one has been introduced into the New World.

Vetiveria zizanoioides Stapf. (= *Andropogon muricatus* Retz. = *A. squarrosus* Cooke) is found practically over the whole of India, and eastwards to Burma. It is very common in every part of the Coromandel Coast, and in Bengal and Burma, where it meets with a low, moist, rich soil, especially on the banks of the water-courses. It covers large tracts of waste land in Cuttack. It inhabits the plains of the Punjab and North-West Provinces, and ascends into Kumaon, 1,000-2,000 ft. in altitude. It is cultivated in Rajputana and Chota Nagpur. It occurs occasionally in Malay gardens, and extends to the West Indies, Brazil, and Lower Guinea. So far it has been found in the wild state only in tropical Asia.

Ayurvedists describe the root as bitter, cooling, stomachic, astringent and an antidote to poisons. They recommend its use in burning sensations, bilious fevers, sweats, foul breath, thirst, strangury, ulcers, and diseases of the blood.

Yunanists hold the root as cooling to the brain, bitter and soporific. They recommend its use in spermatorrhoea, headache, and diseases of the blood.

An infusion of the root is given as a febrifuge, and a powder in bilious complaints. It is regarded as stimulant, sudorific, stomachic, and refrigerant.

The essence is used as a tonic.

A paste of the pulverised roots in water is also used as a cooling external application in fevers.

In Guinea the infusion of the roots is used as a tonic and an emmenagogue. In China it is chiefly used to remove dandruff.

The root and stem are Ayurveda cures for snake-bite and scorpion-sting, but Mhaskar and Caius have shown experimentally that neither is an antidote to either snake or scorpion venom.

Arabic: Izkhir, Usir—; *Bengal:* Bena, Khaskhas, Khor, Kuskus—; *Bombay:* Khasakhasa, Vala—; *Burma:* Miyamoe—; *Canarese:* Dhappa sujai hullu, Kadu karai, Lavancha—; *Chinese:* Ko Cha—; *Cutch:* Vala—; *Deccan:* Khaskhas—; *English:* Cuscus, Khuskhus, Koosa—; *French:* Chientent des Indes, Vétiver—; *Gujerati:* Valo—; *Hindi:* Bala, Balah, Bena, Ganrar, Kaskas, Khas, Onei, Panni, Usir—; *Indo-China:* Chuoc mat, Huong bai—; *Kolami:* Sirom—; *La Reunion:* Vétiver—; *Malay:* Akar wangi—; *Malayalam:* Ramachchamver, Vettiver—; *Marathi:* Vala—; *Mundari:* Birnijono, Sirum, Sirumjono—; *Oudh:* Tin—; *Persian:* Bikhivala, Khas—; *Philippines:* Moro, Raiz do Moro—; *Punjab:* Panni—; *Sadani:* Birni—; *Sanskrit:* Abhaya, Amrinala, Avadaha, Dahaharana, Gandhadhya, Haripriya, Indragupta, Ishtakapatha, Jalameda, Jalashaya, Jalavasa, Rambhu, Katayana, Laghubhaya, Lamajjaka, Nalada, Ranapriya, Samagandhika, Sevyā, Shishira, Shitamulaka, Sugandhimula, Ushira, Vira, Virabhadra, Virana, Virataru, Vitanamulaka—; *Santali:* Sirom—; *Sinhalese:* Saivandera, Savandramul—; *Tamil:* Ilamichamver, Vakil, Vettiver, Vilhalver, Viranam, Virkel, Viyal—; *Telugu:* Avurugaddiveru, Kasavā, Kuruveru, Lamajjakamuveru, Vettiveru, Vidavalliveru—; *Tharu:* Khatra—; *Urdu:* Khas—; *Uriya:* Bena—.

ZEA.

The only species of this genus is of American origin, in cultivation in all warm countries of the world.

Zea mays Linn. is widely cultivated in India.

According to Hindu writers the grain is nutritive, demulcent, emollient, diluent, and absorbent; but, it is liable to produce flatulence.

It is considered by Mahomedan writers to be resolvent, astringent, and very nourishing; they consider it to be a suitable diet in consumption and a relaxed condition of the bowels. It is analgesic, and a decoction is recommended as a hip-bath for piles.

In the Konkan an alkaline solution is prepared from the burnt cobs and is given in lithiasis. In the Central Provinces the centre of the cob, deprived of the seeds and reduced to an ash by burning, is given in combination with common salt in bronchial catarrh and whooping cough.

In Europe and in the United States of America the grain is much used as a valuable article of diet for invalids and children. Corn bread contains more nourishment than wheaten bread, and is a better diet for persons suffering from diseases of the liver, or of the kidneys.

In Greece the silky stigmata are used in decoction in diseases of the bladder, a custom which also obtains in the Philippine Islands, where the plant is considered diuretic. The styles and stigmata have now been generally recognised as diuretic, anodyne, and demulcent. Under the popular name of 'corn silk', a liquid extract is sold as a remedy in irritable conditions of the bladder with turbid and irritating urine; it has a marked diuretic action;

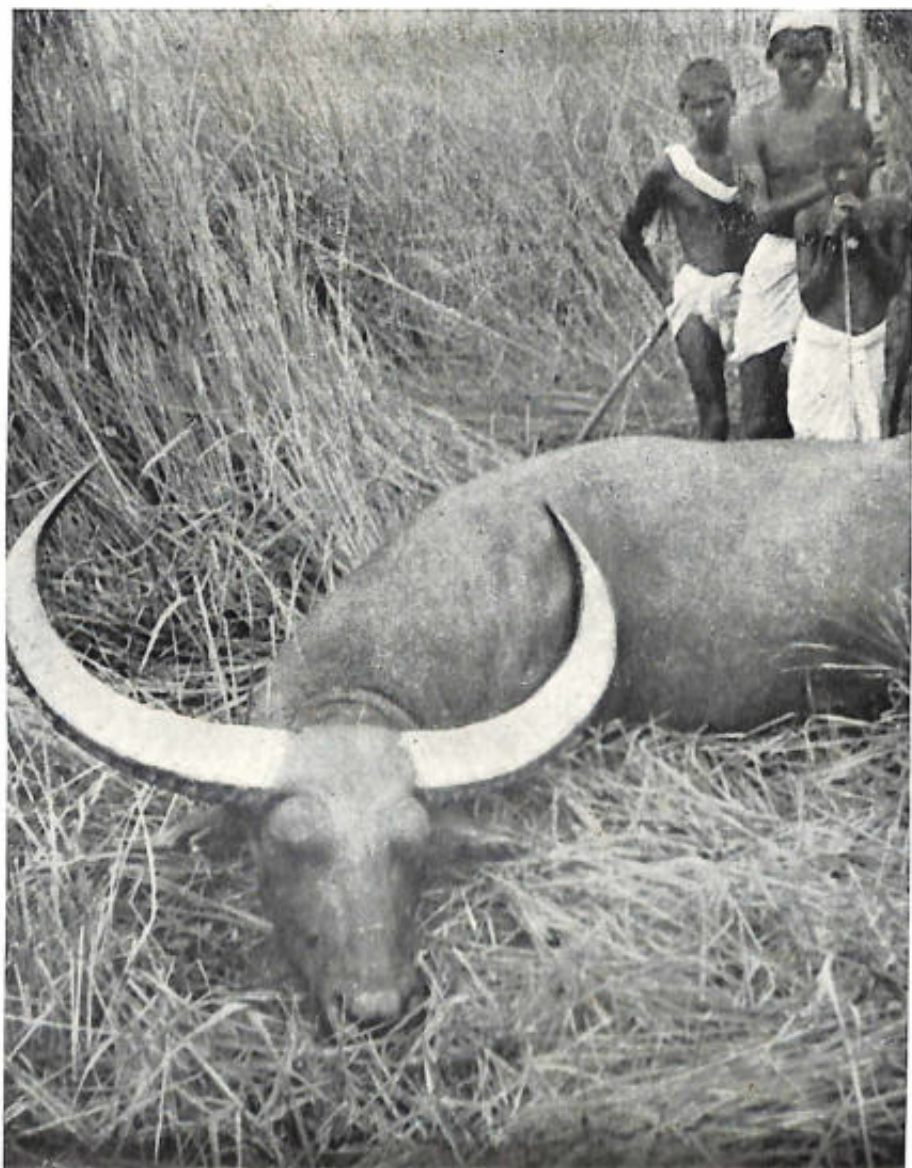
Zea, or the stigmas and styles, is employed in acute and chronic cystitis, and in the bladder irritation of uric acid and phosphatic gravel. It has also been employed in gonorrhoea, and has been affirmed to be a useful diuretic and even cardiac stimulant in the dropsy of heart disease.

The meal is made into emollient poultices. It is also made into mush by boiling, but its exclusive use gives rise to a skin disease.

In Cambodia the grains are prescribed in angina, and the stigmas in paludism.

Animals are sometimes poisoned from eating the green plant. Infants fed on Indian corn flour grow up rickety; it contains only about eighteen grains of proteic substance to the pound. The male flowers are said to contain hydrocyanic acid. The pollen is a possible cause of hay fever.

Accra: Abblay—; *Afghanistan:* Jaori, Jaori, Jaorikhurdani—; *Afrikaans:* Mielie—; *Annam:* Bap ngo, Lua ngo—; *Arabic:* Durabhkisan, Durahshani, Hintaherunu, Khalavan, Khandaruz, Zurratulmakkah—; *Ashanti:* Aburow—; *Awano:* Akple—; *Bengal:* Bhutta, Janar, Kokka—; *Bombay:* Barjoar, Buta, Macka, Makai—; *Brazil:* Zaburro—; *Burma:* Pyaungbu—; *Cambodia:* Paut, Put—; *Canarese:* Goinjol, Makkai jola, Mekkejola, Musukujola—; *Catalan:* Blat de moro—; *Ceylon:* Cholom—; *Chinese:* Pang Tzeu, Yu Shu Shu—; *Chota Nagpur:* Jonar—; *Cochin China:* Bap ngo, Lua ngo—; *Dardanelles:* Kalamasitaro—; *Deccan:* Makkajari, Makkajowari—; *Dutch:* Mais—; *Egypt:* Durra—; *English:* Indian Corn, Maize—; *Ewe:* Akple, Blikple—; *Fanti:* Abru, Aburow—; *Fiji:* Sila ni papalagi—; *French:* Blé de Barbarie, Blé d'Espagne, Blé de Guinée, Blé d'Inde, Blé d'Italie, Blé de Rome, Blétüre, Blé de Turquie, Froment des Indes, Graine de Turquie, Maïs, Maiz, Mil d'Espagne, Gros millet des Indes, Troquet, Truquiet, Turquie—; *Ga:* Able—; *Garhwal:* Junala, Mundgari—; *German:* Tuerkische Korn, Tuerkisher Weizen—; *Gold Coast:* Agbahdor—; *Guam:* Mae's—; *Gujerati:* Makkari—; *Hasada:* Jonra—; *Hausa:* Masara—; *Hindi:* Barajuar, Bhotta, Bhuta, Bhutta, Jawdra, Junri, Kukri, Makai, Makka—; *Hova:* Kasobotso, Katsamanga, Katzaha, Tsako, Tsakot-sako—; *Indo-China:* Bao, Bap, Cennaron, Khao phot, Mali, Ngo, Ngoc thuc thu, Put, Sali—; *Iraq:* Indhrah safra, Idhrah-ash-sham—; *Italian:* Grano siciliano, Grano turco, Melicatto Meliga—; *Kashgar:* Conac—; *Khasi:* U riew hadem—; *Kila Saifulla:* Makai, Maki—; *Konkani:* Maes, Zonallo, Zondlo—; *Krepi:* Adakple, Blikple, Kple, Kpledzi, Watsikple—; *Krobo:* Blaifo—; *Kumaon:* Bhutta, Junala, Mukni—; *Kurdish:* Gumnah shami, Zurat zard—; *Languedoc:* Artho, Avari, Avati, Blamari, Blarama, Garouilhé, Garouillet, Millaral, Millargo, Millargou—; *Laos:* Khao phot, Khot—; *Lepcha:* Kun-tsong—; *Lynggam:* Sob rikhaw—; *Madagascar:* Katsabazaha, Katsakandevolahy, Sako—; *Malayalam:* Cholam, Makka cholam—; *Malta:* Frumentone, Grano-turco, Indian Corn, Kamh irrum, Maize—; *Marathi:* Bonda, Maka—; *Menomini:* Apesapimin—; *Moldavia:* Popusoiu—; *Mundari:* Gorajonra, Gurulujonra, Jondra, Jonra, Loeongionra—; *Naguri:* Jondra—; *North-West Provinces:* Barajuar, Bhutta, Junri, Maka, Makai, Makka—; *Persian:* Bajri, Gaudumemakkah, Kosahemakki—; *Philippines:* Borona, Maiz—; *Portuguese:* Milho, Milho grosso—; *Punjab:* Barajuar, Chhale, Juar, Kukri, Kuthi, Mak, Makkei, Makki—; *Rajputana:* Mukkha—; *Roumanian:* Porumb—; *Russian:* Kukuruva, Mais—; *Sanskrit:* Kandaja, Mahakaya, Makaya, Sauputantastha, Shikhala, Yavanala—; *Santal:* Jondra—; *Sarakhala:* Makkai, Maki—; *Sema:* Kolakiti—; *Shahriq:* Badaghariuari—; *Sierra Leone:* Amarsk Kabe, Nvin—; *Sind:* Barajuar, Makkai—; *Sinhalese:* Bada iringu, Tringu—; *South Africa:* Mealie Corn, Mealies—; *Spanish:* Maiz, Trigo de las Indias, Trigo de Turquía, Zara del Perú—; *Suto:* Poone—; *Tamil:* Makkasholam, Turaka cholam—; *Telugu:* Makkanzonalu, Mokkaiana, Mokka jonnalu—; *Toba:* Makai—; *Tongking:* Bap ngo, Lua ngo—; *Transylvania:* Cucnruz—; *Turkish:* Misir, Sari dari—; *Twi:* Aburow—; *Urdu:* Makai—; *Uriya:* Buta, Maka, Mokha—; *Yemen:* Rumi—; *Zomba:* Chimanga—.



The Rogue Buffalo, Kosi River, horn sweep 96 in., girth 17 $\frac{1}{4}$ in.

SHOOTING WILD BUFFALO IN THE KOSI RIVER SWAMPS.

BY

J. E. HALL.

(With one plate).

It was quite by chance that I discovered there were a few Buffalo left in the extensive Kosi Duars, descendants most probably of the numerous herds that once populated these jungles, which Ingles makes full mention of in his *Tent Life in Tigerland*. Consisting of alternate stretches of high *Kas* grass and *Jhowa* (a kind of Tamarisk) scrub, extremely dense, and growing up to 20 feet in height in places; the jungle is intersected by numerous streams. These are either branches of the main Kosi, or subsidiary streams. Except for high ground in places most of the area is swamp, infested with tiny but extremely vicious mosquitoes. In places there are extensive thickets of dog rose and *Igar* (a peculiar type of tree with white flowers, overrun with red ants). Formerly these jungles especially along the Kosi and Ganges held innumerable Tiger, Buffalo, Hog-Deer, Pig, and occasionally a Rhino strayed in from further north (Nepal). It was in this area in the Purnea District that the Shillingfords made such mighty bags of Tiger. With the extension of cultivation however most of the jungle land has been cultivated; what remains is so small and so subject to annual inundations from the river floods, that little or no game remains. A few pig and an occasional hog-deer or nilgai, with sometimes a straying panther is the most one can find. It was after working with most disappointing results in these riverside jungles, with an expenditure of backbreaking effort that eventually I stumbled on an excellent block comprising some 20,000 acres of high *Kas* and *Jhowa*, which being a shooting preserve of a local Raja had attracted all the buffalo from the surrounding area. The migration of the buffalo being helped along by the extension of cultivation, and reclamation of former swamps. I, however, was lucky enough to know the Raja well, having played out many a hard fought polo match both for and against him. On my approaching him he gladly gave a general shooting permit; also not being extra keen about shikar he asked me to see if the jungle was worth preserving, it having been reserved years ago in his father's time; and with the increasing land values the settlement of the area for cultivation was practically the only course left open to him.

Tracking being out of the question, recourse was had to questing in the most likely places with the help of an elephant. Buffalo were found in fair numbers; but after bagging two of the largest herd bulls, as no solitary was seen, the writer was forced to the

conclusion that many of the buffalo were half-bred, probably from tame buffalo run wild, and joining their wild brethren. This being I was told a not uncommon occurrence. The better of the two bulls shot had a horn sweep of 93 inches with a girth of $19\frac{1}{4}$; the horns were very worn and splintered at the tips. Height from point of shoulder to hoof 62 inches ($15\frac{1}{2}$ hands). He was very heavy and massive and covered with scars. Being told by the junglewallas that April was the best month, when most of the rivers and streams were either dry or low, with the greater part of the *Kas* burnt, I decided on a shoot in April 1933, my intention being to bag a solitary bull. It was perfectly dreadful, excessive heat with a constant high breeze raising continual sandstorms. The skin blistered and peeled off most of my arms and face, my lips were cracked and bleeding after the first day. I tried to do too much and eventually had to give up with sore eyes caused by the amount of sand that had got into them. The shoot however was worth all the discomfort, a really fine solitary bull being bagged on the fourth day, besides some enormous 'Croc'.

We used to start out from the mango tope on the fringe of the jungle, where camp was situated, on the elephant about 4 a.m., swim two streams of the Kosi, and quest the most likely places on foot. The party comprised two locals, my orderly and myself. Getting the bull was sheer luck, we had had a very trying day and were resting in the shade of a high bank when the sun was at its hottest, about half past one. There were a couple of cotton teal in an open bit of water about 80 yards away and I took a pot shot with the little .22 bagging one. One of the locals waded out to get it, he had hardly gone 15 yards when he ducked under water, made his way with only his head above water to a small patch of reeds, and motioned with his hand for me to come at once. With great caution I waded out to him, with only my head above water and the rifle likewise held clear. Putting my head above the reeds and looking in the direction indicated, I got the shock of my life. 40 yards from me there was an enormous head on the surface of the water. As the owner would shake his head to drive away the flies his huge horns would show. To take a correctly placed shot was quite out of question as his body was practically submerged. I gave a shout. The effect was electric, the bull heaved himself up and I fired at right angles behind the shoulder. After a desperate stumble he caught sight of the orderly and the remaining local who were climbing up the bank, and went all out for them. Passing me within 10 yards I let him have the other barrel in the neck; it did not seem to have the slightest effect. I just managed to get in a third shot into the small of his back as he topped the bank, and then the fun started. Rushing up the bank after him we just managed by leaping into a small nullah to avoid a most vicious charge. He then went into some horribly dense wild rose thickets.

Following up the blood spoor, we experienced another charge from the side, but this was not too effective as he blundered into an *Igar* tree. I let him have another shot in the chest and

he came down. The orderly, silly ass, in a wild desire to 'hallal' the bull grabbed hold of one of the horns and after that did not know what hit him. He was sent backwards at least 10 feet by the dying sweep of the horns. His thigh was severely bruised, at one time I thought it broken, and he could not walk for days afterwards. Had the point of the horn struck him his number would have been up. The bull, however, was a grand beast, typical solitary, with horns $19\frac{1}{2}$ inches in girth, 109 inches tip to tip across forehead, 17 hands in height. I checked these measurements with the greatest care. I have never seen a more massive animal.

I had been granted permission to shoot one cow buffalo, but so far had seen nothing exceptional, though heads of 7 and 8 feet (as far as I could judge) were seen. However, by this time I had got to know the jungle better and my uncle who had arranged to join me, in the meanwhile decided against foot-slogging; his weight is nearly 14 stone. We decided to return in October. Towards the latter half of that month we marched nearly 18 miles from the station in pouring rain and pitched camp in the Raj Katcherry. The tehsildar had obtained the loan of two staunch elephants. Without going into detail I may state that between us we bagged a fine bull, though not as big as the one obtained in April; this was uncle's, though I had to help hard, especially as he went for my elephant. We also shot a really fine cow. This latter cost us two days hard work, but eventually we managed to isolate her from a herd of some dozen individuals and I got her in two picked shots without indiscriminate firing as is usual in bagging a herd animal. She was worth the trouble and effort, her horns measuring 13 inches in girth and 112 inches in sweep. This cow was very old and scraggy. I was also compelled to shoot a fine young breeding cow who charged and chivvied my orderly and the skinners. She would not leave a certain patch of jungle, where we afterwards found a young calf. I felt so cut up about this that I abandoned the shoot. We tried to rear the calf but it was sickly having some sort of cow-pox, and it succumbed after a few days.

Some time later I had rather an amusing letter from the tehsildar, part of which I give below:—

SRIMATA,

21st March, 1934.

'MY DEAR J. E. HALL, ESQ.,

I did not receive any letter since a long time. Perhaps you have forgotten me at all, but I don't. I have reported that the buffalo who was shot by your uncle, has become lame, and now it is turned into ferocious condition. One man has been wounded by that very buffalo and he died as soon as he was approached to —hospital, etc, etc.

Yours sincerely,

AZIZ KHAN,

Tehsildar.'

This was serious for, as far as I knew, neither uncle nor myself were responsible for wounding any buffalo. I was unable to obtain leave just at the time, and before I could get away two more men had been killed. Eventually I went with a friend and we succeeded in bagging the culprit, a herd bull, probably a crop raider, who had two hammered lead slugs in him, on the forearm and shoulder. It appears that he used to lie up near water and if anybody, cowherd or grasscutter passed his side he would rush and gore or trample them to death. When he was shot he had three deaths and some four maulings to his discredit. He had a habit of raiding the paddy fields, where most probably he got wounded from a machan, and going for anybody who attempted to drive him away. He was a fairly big bull 16 hands high, with horns measuring 96 inches in sweep by $17\frac{3}{4}$ inches in girth. His head is shown in the accompanying plate. My friend, White, who was with me on this shoot, and myself had a rather narrow shave from a herd of buffalo on this trip. We were sitting towards dusk smoking, when we saw a herd containing a fine animal which in the uncertain light we took to be a bull crossing a stream to our left. We rushed for the spot, and I almost bumped into the buffalo in question. To the sound of my shot there was a general stampede by the herd in the high grass in our direction and we had to run pretty fast to clear them. The animal fired at turned out to be a cow but with a fine head measuring 9 feet 4 inches in sweep (112 inches). My punishment consisted in carrying that head covered with blood, weighing at least 80 lbs. or more, for very nearly 7 miles. We lost our way in the dark, floundered into swamps, and did not get into camp till the night was half passed. I refused to abandon the head under any circumstances.

Reading the above one must not get the idea that we habitually shot cows, in fact only three were shot during the course of three years, of which one was in error (the one above), one for a collection (the first), and one in sheer desperation to avoid a tragedy.

When the heavy jungle is taken into consideration it is really a wonder that more accidents of a like nature did not occur; we were however most careful on this point, and once I let a beautiful cow go, with I think at least 12 feet horns (sweep); she would have been a trophy worth keeping in a national collection, but she had a small calf at heel, and so was not molested. I never saw her again in spite of hunting for her for days at a time, with a cine camera.

It should also be borne in mind that arrangements had been made to clear the jungle for cultivation; and if we spared, the villagers did not. I rather flatter myself that as a result of a personal appeal to the Raja and his Estate Manager it was decided to stop the removal of the jungle and declare the area a closed preserve. This has been done, and though I lose by not being allowed to shoot, it is much the better arrangement; as I think that the wild buffalo is a species that is fast dying out and in need of very careful and strict preservation. I have since had a

couple of days after hog-deer and panther in these jungles and note with the utmost satisfaction that the wild buffalo are increasing, so much so that I think steps will have to be taken to reduce their numbers, by shooting out obviously half bred and inferior animals. The area being circumscribed can only support a limited number otherwise pox and rinderpest will take toll in a drastic fashion. Now a few notes with regard to kit, etc.

Use the heaviest rifle you can, mine is a 450/400 H.V. double barrel; bullets should be either solid or with just the tip exposed, a split bullet breaks up on impact and has no penetration. The best shot I find is at the triangle. Pig-sticking taught me this. The triangle is that part of the back about 12 inches by 9 inches just behind the last rib, and level with the spine. If you get the spine the animal is paralysed in the hind legs and cannot move, if you go a little low the bullet takes him in the kidneys or liver and he cannot go very far. Unless perfectly placed low down a lung shot leaves an animal with plenty of go and he may take you far with the chance of a charge in the process. When questing on foot, search all the open spaces in the high grass between the heavy jungle and the crops up to about 8 a.m. You usually find a bull or so grazing after a night out. In the hot weather quest along the banks of streams in the jungle or stalk the wallows and pools, the best time for this is between 12 noon and 2 in the afternoon. Again in the evening quest along the maidans as in the morning for the buffalo coming out to graze at night. Following them up in the dense cover that exists is impossible and decidedly dangerous.

Buffalo horns go in all shapes though the bulls have mostly horns set in an arc of a circle, either more or less circular. Cows on the other hand show great variety: turn over horns are common, straight out from the head is another type. I do not agree with there being two varieties of buffalo, in my opinion there is only one type, with variations, either due to environment, or interbreeding with tame animals run wild. Shooting on foot is the cream of the sport though fearfully exhausting in the hot weather; shooting off elephants in heavy cover if only one or two elephants are employed requires profound patience, and a considerable knowledge of woodcraft. Shooting with lines of elephants is glorified butchery, which I have no experience of. When shooting off an elephant in high *Kas* jungle, where the buffalo are invisible at any distance beyond a few yards, an invaluable tip is to look out for paddy birds (egrets) who settle on the backs of the animals to pick off ticks, etc. Any wheeling by such birds about a particular spot is a sure indication of the presence of buffalo. You should also have a shot gun loaded with 'Lethal' ball handy as very often a hog-deer rises up practically under the elephant's trunk. I once lost a fine stag by not being prepared. In this way I have been lucky enough to bag some good hog-deer and *kakur* or barking-deer. An occasional panther is sometimes raised, but as a rule these brutes squat in a bush and refuse to move unless almost stamped upon; and when they do break all one sees is a flash of yellow and black. It is far more convenient to sit on

the pad and drive the elephant oneself, in this way there is no chance of the mahout getting in the line of sight. I have heard of one unfortunate's head being blown off by an excitable griff. Moreover you are in the best position to take a snapshot. Driving an elephant is not difficult of attainment especially if you tip the mahout to show you the particular tricks of his individual beast. Always have the mahout on the pad behind you, as he can also control the animal by command. Shooting off a howdah makes the shikari frightfully sick, besides which howdahs are very seldom obtainable. Some practice is necessary to shoot off an elephant with any accuracy. I usually fix a light slip of wood with insulating tape along the barrels; this covers my sights and permits my using the rifle as a shot gun. Elevation should be judged according to range, but in actual practice shots are seldom taken beyond point blank distance. Avoid shooting a head out of a collection of bulls, these are usually good though inferior to the solitary bulls. These gatherings are of younger bulls too undeveloped to contest for the mastery of a herd, and if you do shoot one you may find yourself in a predicament with the remainder refusing to leave the dead one and pawing up the ground, smelling the blood, bellowing, and generally making most trying demonstrations, which if there is not a tree handy as once happened to me is decidedly bad for the nerves. Avoid a cow with a calf like poison, meddling with her means that you will have to shoot darned fast and straight in the end to avoid someone being hurt. Look at the base of the horn with a good glass, if it is flat, triangular, with a frontal breadth of at least 8 inches and heavily corrugated it's a bull. A rounded smooth horn with very little taper in the first half of its length belongs to a cow. Spread in a head is just as important as length, so try to bag a bull with the tips of his horns well apart. Horns and skulls are easily cleaned and mounted on shields, see that you pour kerosine oil or turps at frequent intervals into the outer sheaths to avoid excessive shrinkage and beetles, which otherwise eat horns away from the base. The hoofs mounted in silver make delightful and unique ashtrays (half a hoof well dried and polished), I have a couple which are the envy of all who see them.

Reading through these notes I find that I have commented rather freely on the charging habits of wild buffalo. Naturally I remember best the shoots that were more exciting, but on the whole with our modern rifles I do not think that shooting wild buffalo is any more dangerous than pig-sticking or following up a wounded tiger. In nine cases out of ten the bull is dead before he realises what is happening. It is the tenth case, when following up a wounded beast, or one that has had a slug in him from some cultivator's gun, that produces the incidents and occasional accident. I did hear that a couple of sportsmen had been injured during previous years, and in both cases they were entirely to blame for using shot-guns or rifles totally inadequate for the purpose. One man who was using I think a .280 Ross got a couple of ribs and a leg smashed. I consider he was lucky to get away alive.

As regards how buffalo charge, in dense cover there is usually no time to note particulars. All one sees is an immense head and horns, accompanied by fearful crashing in the thickets at a distance of 5 or 6 yards. If your luck is in he passes to your front, if not and he faces you I really cannot advise you how to manage, I usually dive behind the nearest cover and let him have a shot when he pulls up in indecision before making up his mind to follow you. I can speak with greater certainty as to how they charge elephants, as I have on three occasions been charged or seen another charged. In each case there was a preliminary grunt, low and subdued, followed by a trot with the nose up, horns well back across the neck. The horns were only lowered when about 10 yards distant from the elephant, when the trot was changed to a series of bounds. The actual strike with the horns was made with a sideways sweep. I have seen an elephant horribly gored in the region of the stomach, the horn penetrating some 8 or 10 inches. This was a case where a cow sitting in high grass absolutely jumped up at the elephant, the elephant fled being pursued by the cow who gave her a good shove behind whenever possible.

These preserved jungles were very fine, one could moon round looking at buffalo and taking photographs, if not actually shooting, whilst mighty boar and fine heavy hog-deer kept the senses sufficiently alert to fully appreciate the snap-shooting practice one used to indulge in as a light-horseman in the Volunteers. It was a delight to slay Mugger. These ugly brutes were in every swamp and creek, and grew to immense size—17 feet in length being the biggest we ever got. The number of brass and copper bangles and anklets we got out of their stomachs surely couldn't have come from corpses only. Gharial or long snouted crocodile also went to great length in the Kosi streams; the biggest we ever got was nearly 23 feet from the tip of his snout to the end of his tail, the lumps on his nose were as big as saucers: this brute also disillusioned me as to this type being purely fish-eaters, as when cut open we took out of him a child's thigh bones complete with silver bangles as well as a flattened brass 'Lota'. In addition small game of all descriptions was to be had with little or no trouble, snipe, teal, black and swamp partridge, quail, pea-fowl, and an occasional florican (Lik or lesser species). Storks, waders and kindred non-sporting birds were in their legions in every swamp, whilst in the paddy-fields the wary Koolung or Demoiselle Crane could be stalked and bagged for the pot with the light rifle.

Measurements recorded are as follows:—

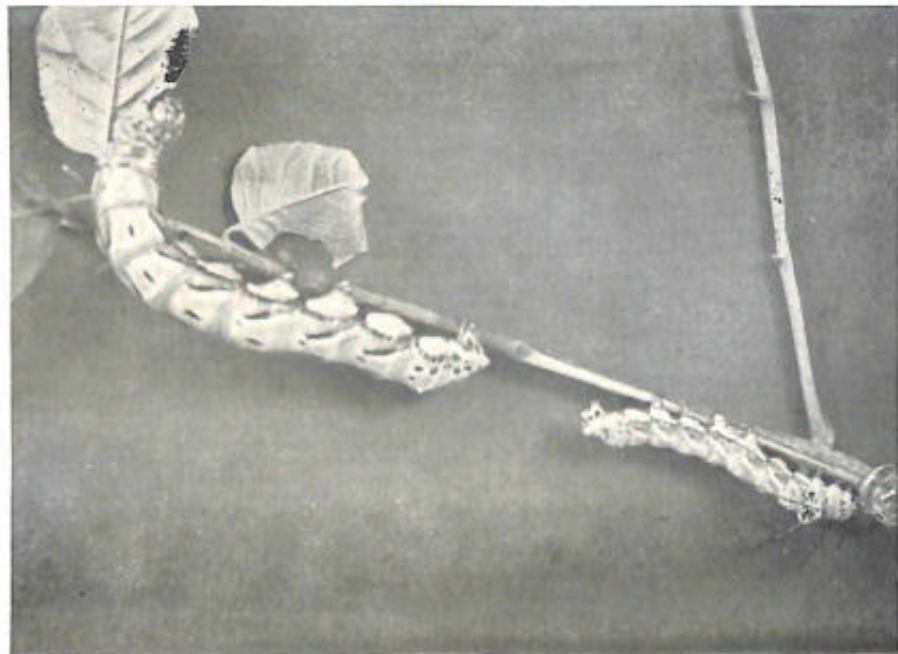
A. Big Bull Buffalo with self just after being shot, horn sweep 109 inches, girth 19½ inches. Height after being properly laid out 68 inches.

B. The Rogue Buffalo, horn sweep 96 inches, girth 17½ inches.

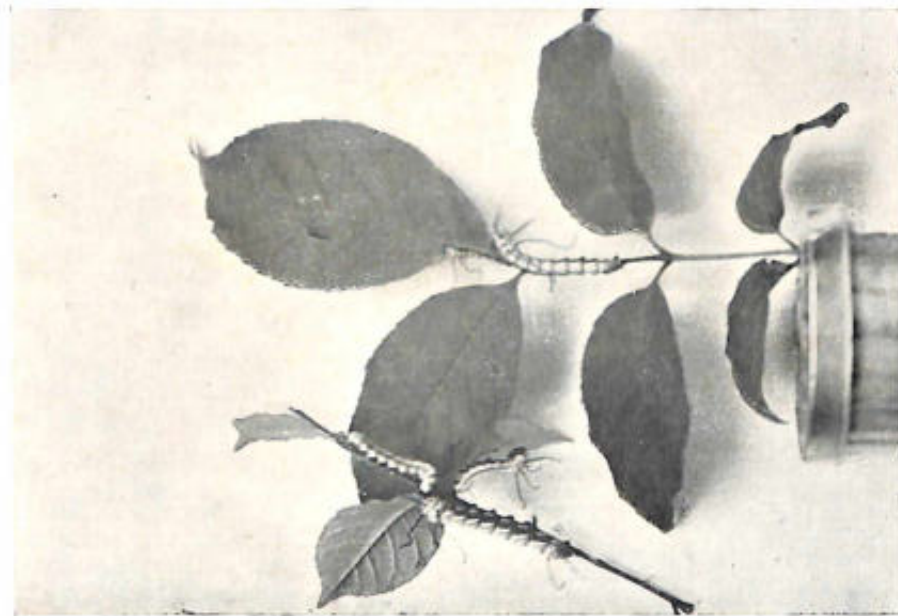
C. Cow, sweep 112 inches, girth 13 inches, tip to tip 49 inches.

To anybody wanting expert information on the Wild Buffalo, I can recommend J. D. Inverarity's excellent article in the Bombay Natural History Society's *Journal*, vol. x, No. 1, of 10th November 1895.

For Wild Buffalo Shikar I think Assam is the only province where the average shikari of moderate means can meet with any success, though even there I should think that anything over 108 inches in sweep is rare.



A. Larvae Nos. 2 and 5 of *Brahmia scotticlii*,
rather less than full size.



B. All five larvae of *Brahmia scotticlii* on ash-twigs.

THE LIFE-HISTORY FROM EGG TO PUPA OF
BRAHMEA WALLICHII GRAY.

BY

MAJOR J. A. GRAHAM, R.E.,

Headquarters, Meerut District, Dehra Dun.

(With 2 plates and 4 text-figures).

Having had the opportunity to rear some larvae ex-ovo, the following details of this peculiar species may be of interest to lepidopterists—more especially as I am informed that the life-history is not known.

At Naini Tal on June 27th 1935 I received from a friend a female *Brahmeid* moth, which during its incarceration in a cardboard box had deposited 37 ova. The moth was so worn as to be worthless as a cabinet specimen, and it was released on the trellis-work of the bungalow verandah, over which was growing common honeysuckle. Next morning 10 more eggs were found on the trellis where the moth had been placed.

Ovum.—The egg is almost three-quarters spherical, on a flat base, and very slightly depressed at the distinct dark grey micropyle; colour pale yellow, darker tinged near summit; diameter 2.5 mm., height 1.8 mm. On the eighth day the colour is grey with a deep brick-red area round the summit. On the tenth day the head and black and grey colouring of the larva inside are plainly discernible; the larvae hatched on July 8th, the eleventh day from deposition of ova.

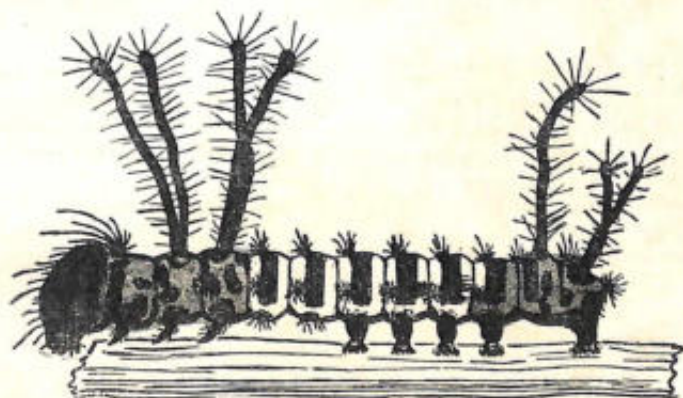


Fig. 1a. Larva of *B. wallichii*. \times about 10.
Side view, 36 hours old. Length 7.0 mm.

Larva.—On emergence the first meal is the egg-shell; some eat practically all, some have only a few nibbles. The larvae

present a most peculiar appearance, and look much too big for the shell they emerge from (Fig. 1a.). Length at 36 hours of age is 7.0 mm., and the longest fleshy protuberance or 'tentacle' is about 3.25 mm. The general colour is greyish white with black transverse bars, and yellow with black markings on the first three and last two somites, the 'tentacles' being black.

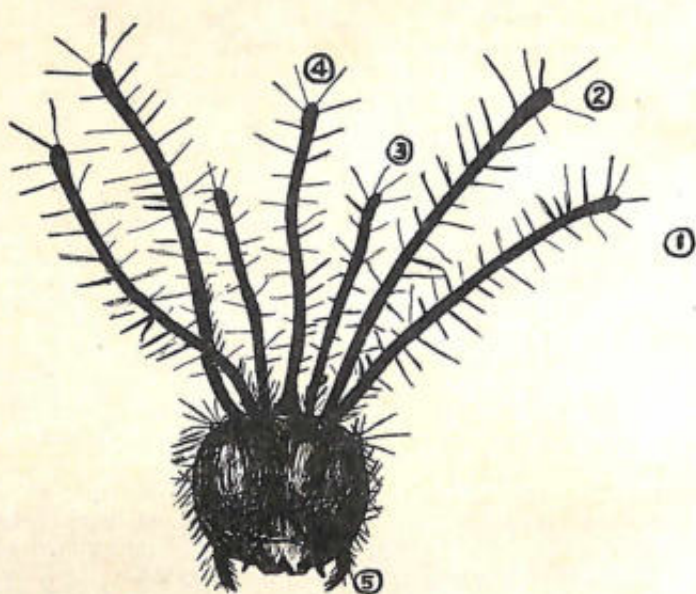


Fig. 1b. Front view of larva of *B. wallichii*. \times about 15.

- (1) 2nd somital pair of 'tentacles'. (2) 3rd somital pair. (3) Anal somital pair. (4) Anal somital (single). (5) 1st pair of true legs.

During the next four days nineteen different trees and shrubs and several creepers were tried as food-plants without success; in consequence all the young larvae died of starvation except five which at last began to feed on a species of Ash (*Fraxinus macrocartha*).

On July 14th the two larger larvae were 14 mm. long, and very plump, so that the head was relatively small; the second and third somites were pale yellow and swollen. These two larvae completed their first moult between 8 p.m. and 12-30 a.m. on the night of July 15th-16th. The moulting position for all moults is on the underside central rib of a leaf or of the leaf-stalk, preferably head downwards.

The remainder of this account deals chiefly with the history of the largest larva as typical.

Fig. 2 shows the changes that result from the first moult. The black bars are reduced to two longitudinal marks per somite, the sublateral and ventral surfaces are yellow, and each somital joint is tinged with yellow. All the bristles on the 'tentacles'

have gone, and the latter are much longer, peculiarly bent and kinked, and shiny black; the 'tentacles' are not moveable except in a general fore and aft direction by movement of the skin at

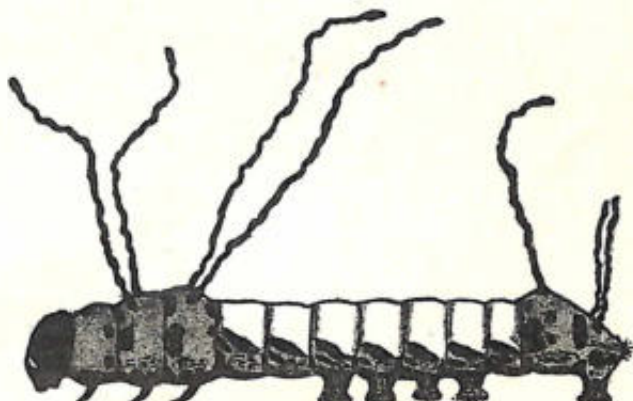


Fig. 2. Side view of larva of *B. wallichii*. \times about 5. In 2nd instar. Aged 8 days; length 16 mm.

their points of attachment. All warts except one small anal one have also disappeared. The alarmed attitude is very similar to that of a *Sphinx ligustri* larva, but the head is even more recurved as it touches the sixth somite.

On July 19th the larva was 20.5 mm. long and preparing for its second moult, which took place early a.m. 20th. By 6 p.m. on this date the length was 24 mm.; the first pair of 'tentacles' 12 mm., second pair 14 mm., single anal one 7.5 mm., and anal pair 5 mm. Thickness of larger pair about 0.2 mm. The head is now marked with black bars on a greenish yellow ground (Fig. 3). Body markings are as previously except that the each lateral and sublateral ones are finer. The sublateral portion of each somite is somewhat folded and wrinkled.

The third larva was watched whilst moulting between 9-10 and 9-25 p.m. on July 21st. On emergence from the old skin, the head is like an unripe maize-grain, and the tentacles like irregular bits of greenish glass-thread; whilst drawing itself out of the skin the tentacles can be seen folded flat along the dorsum reaching to about the tenth somite. They are apparently

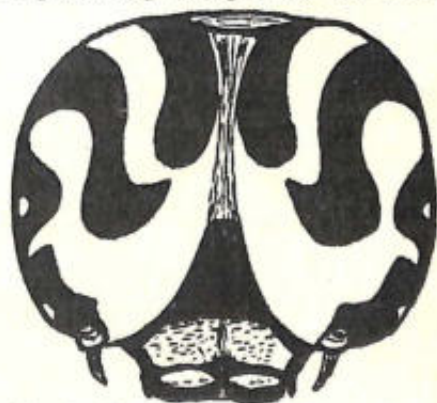


Fig. 3. Head of *B. wallichii*, \times about 20. in 3rd instar.

not connected in any way with the old tentacles which are shed complete on the old skin. When the last somite is withdrawn

by one or two jerks of the body, the larva uses its jaws to free the three anal tentacles from each other as they are more or less stuck together.

The head markings and tentacles of this larva were fully black by 10-30 p.m., about an hour after moulting.

On July 23rd the largest larva was 31 mm. long and preparing for its third moult. The tentacles do not increase in length or thickness with body growth during each instar.

The third moult occurred about 10-30 p.m. on July 24th. The only appreciable alteration in markings is that the sublateral black markings are wider and the intersomital joints more yellow. At 4 p.m. on July 25th this larva was 34 mm. long. The tentacles seem to have been damaged during withdrawal, as their lengths are now:—

1st pair right, 10 mm.; left, 18 mm.; 2nd pair right, 24 mm.; left, 17 mm.; anal single, 13 mm.; anal pair, 6 mm. each and slender.

The last 3 mm. of the anal single one is re-curved posteriorly like a hook.

When the second larva moulted for the third time, the tentacles also varied in lengths as below:—

1st pair right, 9 mm.; left, 17 mm.; 2nd pair right, 23 mm.; left, 24 mm.; anal single, 13 mm.; anal pair, 7 mm.

Plate II gives an impression of the front view of a larva in third and fourth instar in the alarmed position. The head is bent down in between the foremost pair of prolegs which are raised from the stalk on which the caterpillar is resting.

On July 27th the largest larva was 54 mm. long, average thickness of body 7 mm. Twelve hours later its length was 61 mm. The skin is now very smooth, shiny and well filled out. Plate IB shows the five larvae on food-plant.

On July 29th this larva prepared for its last moult, which occurred between 3 p.m. and 5 p.m. on July 31st. The head markings did not get fully black till about 7-30 p.m.

In this last instar the seven tentacles are completely shed; on the second and third somites they are replaced by oval-shaped chalk-white marks with a tiny wart in the centre, on a dirty olive-green ground. The lateral markings on first three somites are now fine black reticulations filled in with white. The third somite is double-humped and has a pair of large chestnut-coloured spots posteriorly, with black centres.

Somites 5 to 10 have a dorsal black cigar-shaped mark, and two small black dots anteriorly. On the anal somite there is no trace of the single tentacle, but a prominent hump with a blunt point; the posterior half has black spots where the last pair of tentacles were; the vent is surmounted by a triangular anal plate tipped with black. The ventral surface is dirty brownish with a medial black stripe and edged by the black sublateral lines which are much thicker.

Plate IA, taken on August 8th, shows the second largest larva in the last instar together with the smallest, which was rather a weakling, in its fourth instar one month after hatching.



About x 3

Front view of larva, 4th instar, in alarmed position.

On August 7th the largest larva, now 110 mm. long had changed its dorsal colouring to dull orange—obviously preparatory to pupating, as it was restless. An assortment of soil, stones, twigs, moss and bark was provided for pupation, but was not received with gratitude, and the larva duly pupated on August 13th on the floor of the breeding cage under a loose piece of bark.

The third larva attained a length of 114 mm. when full-grown.

The pupa is deep brownish black, naked, cylindrical, smooth but not shiny; length 44 mm. exclusive of anal spike which is strong, 4 mm. long and furnished with two small sharp points about .75 mm. long; diameter at lower edge of wing cases 14 mm.; at the base of the thoracic plate is a curious raised transverse feature, with a double pit or indentation centrally and a small pit at each side. Segments 8 and 9 have small knobs in the positions of the old prolegs.

None of the other larvae made any use of the materials supplied for pupation, and it is regretted that no notes can be given of their natural pupation habits.

After moulting the larvae must eat the old skin, as no traces were found after any moult (other than the fourth) except the head and bits of the old tentacles.

The appetite is enormous, and it is of interest that although by no means lethargic, the larvae do not wander, but prefer to remain on a particular twig until all available leaves and stalks are consumed. A move is then made to the next nearest twig providing a meal.

In conclusion, the following table gives the average periods for the various changes from deposition of egg to pupation.

| | | | | |
|-------------------|-----|-----|----------|--------------------------------|
| Period in ovo ... | ... | ... | 10½ days | } Average total 50 days. |
| " to 1st moult | ... | ... | 8½ " | |
| " to 2nd " | ... | ... | 4 " | |
| " to 3rd " | ... | ... | 6 " | |
| " to 4th " | ... | ... | 7 " | |
| " to pupation | ... | ... | 14 " | |

A FISHING TRIP IN KUMAON.

BY

A. ST. J. MACDONALD.

(With two plates).

Assuming that anglers like myself scan the papers for new and up-to-date information of rivers to spend a fishing holiday on, I am writing this note of my recent trip up the Kali, Sarju, and Eastern Ramganga rivers in Kumaon. There is much which needs adjustment in Skene Dhu's book, in both the fishing water and the route to be followed. I worked the Kali or Sarda from Tanakpur to Padeshwar, where the Sarju joins and up the Sarju to above Kapkote on the Pindari Glacier road, then over the Sema Pass to Tejam and down the Ramganga to Rameshwar where it joins the Sarju a distance of 280 miles of fishing water. In all this stretch of water the rivers need only be left in four places, and worked along above by village paths or roads. If given time, the water can be approached at certain points if one is prepared to descend and climb a few hundred feet. Kit can be carried along the rivers by Dhutials without whom it would be impossible to undertake the trip. The local Pahari or Kumaonee would let one down and ask extortionate wages. It must not be presumed by these notes that it is an easy matter to follow up the river-bed. Much boulder stepping and climbing is necessary to get by land-slides and cliffs, and in some places difficult wading from one bank to the other, but as long as marches are kept to five and six miles over the difficult stretches, the water can almost all be fished and good sport obtained.

In the two months I spent on my holiday, I had fifty fishing days and caught with another rod (which was with me for a time only and fished only a couple of hours a day) 117 fish=946 lbs., over an average of 8 lbs. Five best fish scaled 96, 40, 36, 30 and 29 lbs. The best bag in one day was 16 fish to my own rod, and the best weight in a day was 117 lbs. for 8 fish, with Fly Rod. The best day was 16 fish=52 lbs., best 6½ lbs.

From Tanakpur one can follow the Kali to Chuka where the Ladaya joins 21 miles. From two miles above Chuka one must leave the river and climb over the ridge, a stiff climb of 5,700 ft. to a village on the top, Dabangaon—a distance of six miles. Camp here on the north side, and if the weather is fine, an excellent view of the snows can be had. From here march to Gurmack-tashwar (14 miles). A dull march over open slopes and then a steep descent for the last two miles. The Loha Ghat stream joins in here. The river from here can be followed to above Kapkote and no further difficulty is experienced till below Tejam to Thal on the Ramganga. There is a wonderful gorge here, which must hold monsters, but it wants to be worked very



A morning's catch at the junction of the
Ladaya with the Kali.



The junction at Pacheshwar showing the Temple
Rock: the saviour of many a monster. My line
was cut through 3 times in a day.



A typical gorge on the Ramganga below Anisghat, and a natural sanctuary for fish.



Big water with big fellows. I lost here a fish which left behind a scale $3\frac{1}{2}$ in. in diameter.

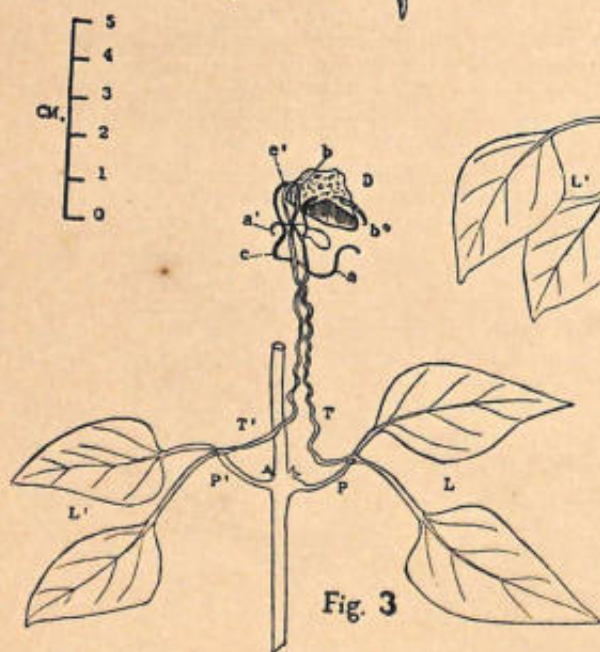
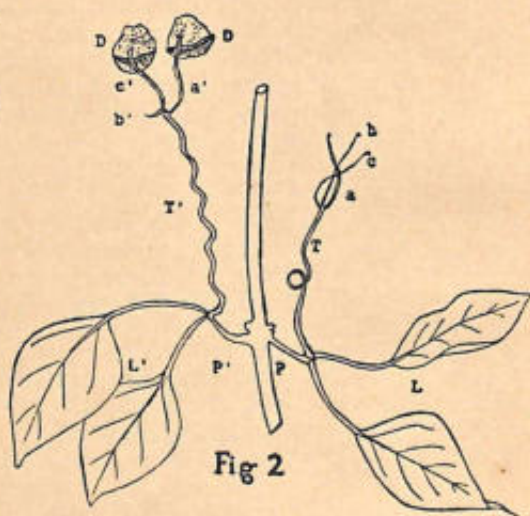
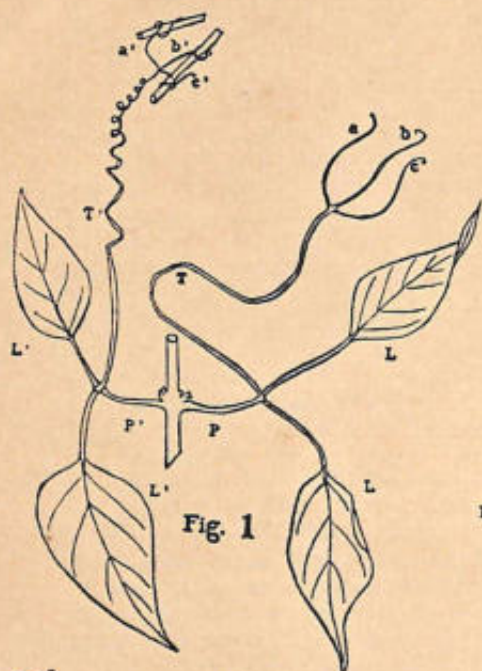
thoroughly and in small stretches. The D.B. road is 600 ft. or so above the river, and much climbing is necessary to get to and from good water. The river is again difficult at a point below Thal at Munipani where it enters a gorge and is impossible for a mile or so, but the path along the right bank keeps near and above the river which can be approached in some places. From here to Aulaghat, water is good and can be worked to a point just below. Here again is a gorge, but a path leads along the face of a precipice for three miles and is but a few inches wide and takes time for the coolies to negotiate with loads. A false step or slipping stone would end in disaster several hundreds of feet below. The path should only be attempted if one has a good head for heights. From it is only eleven miles to Rameshwar. Intermediate water is excellent and can be approached anywhere provided one is prepared for heavy work in descending and climbing. These gorges are the saviour of the fish. They serve as sanctuaries, and are still unmolested by the hand of man. Wild and well forested they are the few remaining landmarks of the Kumaon of long years ago. This note read with Skene Dhu's book gives an idea of the rivers as they are today and the route to follow.

To those unacquainted with these rivers a note on tackle will be of interest. A ten-foot spinning rod and fly rod with wire traces for spinning and gut for fly spoon work meets one's outfit. The water is gin clear and the river small, so that unless one's tackle is of the finest, few fish will be caught. Spoon does not meet with success and Chilwa (or rather small fish for I never saw a Chilwa in the rivers) is far the most killing in the Sarju. Spoon is killing in the Ramganga. A small net is necessary for catching small bait and 150 yds. of line, ample. Like all Himalayan rivers the snags and rocks are sharp-edged and cut through gut or one's line like a knife. Killen wire is the best form of wire for traces and can be made up in a few moments. The places to fish are the same as in all rivers, in and below rapids or at the end of pools above rapids. The best time appears to be from the time the sun gets on to the water until it leaves it in the evening. Early morning and late evening did not meet with much success, and I found, once the fish started to rise after the sun left the water, it was useless continuing. Cloudy, rainy, and sunny days all gave good and bad sport so I would not speak for or against weather conditions. I think, for Mah-seer anyway, the only element that matters is the water, and exactly how remains a problem to be solved. Fly spoon $\frac{1}{2}$ an inch, I found better than any other size and gilt and silver seems to take best. At burning ghats, huge fish are to be seen cruising about but not to be tempted with either spoon or small fish. Atta I tried without luck, and meat if it can be obtained will provide a run or two, but the idea is repulsive, as anyone who has visited these waters will know. The moment a corpse is released the water is alive with corpse eating fish from 60 lbs. downwards. I tried a black and red spoon on these fish to try and represent their fancied though depraved taste, but met with

no success. It is a waste of time fishing at these places as good fish are to be taken in the rapids above and below gorges where the country is wild and unmolested. Supplies like atta, rice, milk and ghee, are to be had in most villages. Fowls and eggs are scarce and expensive, so that a certain amount of tinned provisions, are necessary.

A few general remarks on shooting and the state of the country, may be of interest. In this connection I can only paint a picture of gloom. The fish are poached from end to end, from Pacheswar to Kapkote on the Sarju, and Tejam on the Ramganga. Fish traps, nets, spears and weirs to divert the water and leave the fish high and dry, for easy capture, are in great evidence. I have seen baskets of young Mahseer caught in this way by three or four children, so that with the colonising of the valleys, the destiny of these rivers for sport is gloomy, unless some enquiries are made and protection is enforced by the Civil Administration. A much more curious feature is that none of the commoner fishes of the Indian rivers are to be seen. *Rohu*, *Kalbash*, *Bowali*, *Tengra*, *Butchwa*, *Chilwa* and the other Carps are all missing. I examined baskets of fish and in such clear water it is easy to pick out the fish in variety. The local people attribute this to the Sarda canal headworks at Bombassa, whether this is a fact or not, it is one calling for investigation and immediate adjustment, if these rivers are to remain the fishing waters they are attributed to be. Game by the river is scarce, and it is pathetic to see Goral, Muntjac, and Koklass pheasants down by the rivers in May because of the fires on the hills, which have driven them down for safety. The fire season is from April till the rains break, and hardly a hill side escapes unless it is a Regeneration Reserve for Cheer Pine. The damage to bird life (nesting at this time), insect life and the subsequent destruction of creatures which are driven down to the rivers and make easy prey for the numerous *Bundook Wallahs*, is deplorable. While fishing, I have on three occasions had Goral on the opposite bank, within easy range of a shot gun. The haze caused by these fires is like a cloudy day, or the western sky in the plains when the Loo is at its height.

This is the Kumaon of today and unless a commission which includes experts in Ornithology, Pisciculture, and Entomology, are soon appointed to adjust this state of affairs, there will be little left but the terraced labours of man, and the dry springs of administration. And the day is in sight when there will be no fuel or water available to provide for the ancient rights of the Sons of India.



Adhesive tendrils in *Bignonia venusta* Ker.-Gawl.

(For explanation of figures see end of article).

ON THE OCCURRENCE OF ADHESIVE TENDRILS IN *BIGNONIA*
VENUSTA KER-GAWL.

BY

J. F. R. D'ALMEIDA, B.A., M.Sc.

(Professor of Botany, St. Xavier's College, Bombay).

(With one plate).

The formation in consequence of mechanical irritation of cellular outgrowths in the shape of 'discs', 'balls', 'pads' or 'suckers' on tendrils by means of which they attach themselves to rocks, walls, the bark of trees or other similar supports has been the subject of investigation by various writers, and Darwin (1), Göebel (3), Kerner and Oliver (4), and Pfeffer (10) cite several instances of such tendrils.

Amongst the AMPPELIDACEAE adhesive tendrils have been observed in *Vitis hederacea* Ehrh. (= *V. quinquefolia* Lam., *Ampelopsis hederacea* DC., *A. quinquefolia* Michx., *Psedera quinquefolia* Greene, *Hedera quinquefolia* Linn.) (1), (4), (7), *V. inconstans* Miq. (= *Ampelopsis Veitchii* Hort., *A. tricuspidata* Sieb. & Zucc., *Psedera tricuspidata* Rehder) (4), (6), *V. capreolata* D. Don (= *V. Royleana* Hort.) (4), *V. ternata* Baker (= *Cissus paulinifolia* Vell.) (10), and *V. assamica* M. Laws (11). The tendrils of most CURCUBITACEAE show a certain proliferation of the epidermal and cortical cells and in *Sicyos angulata* Linn. and a few other Cucurbitaceae the fixation is aided by a viscid secretion (8), (10), whilst in *Hanburia mexicana* Seem. (1), (3), (4), (10), *Peponopsis adhaerens* Naud. (3), (9), *Gymnopetalum cochinchinense* Kurz (11), and *Trichosanthes pubera* Blume (= *T. palmata* Roxb.) (11) structures analogous to adhesive discs are formed. Similar outgrowths have also been observed in the BIGNONIACEAE, for instance, *Bignonia capreolata* Linn. (1), (3), (4), (10), *B. littoralis* H. B. & K. (1), (3), (4), (10), *Amphilophium Mutisii* H. B. & K. (= *Amphilobium Mutisii* Loud.) (10); and *Aptolophium* Cham. (= *Haptolophium* Endl.) (2). To this list it is proposed to add *Bignonia venusta* Ker-Gawl. whose tendrils the present writer has observed occasionally to produce similar adhesive masses, but before we proceed to deal with these it will be well to state a few facts known about these peculiar outgrowths in the plants that have already come under the observation of previous investigators.

Von Mohl was the first to show that such adhesive structures appear in response to the stimulus of contact with a firm body (6). They are usually formed by outgrowths from the epidermal cells and subjacent parenchyma, and they secure a firm hold of the support by growing into the irregularities of its surface and secreting a sticky substance or cement which completes the attachment (1), (4), (5), (10). Adhesive tendrils either require the stimulus of contact for the first development of their discs, e.g. *Vitis hederacea* (1), (4), (10); *V. capreolata* (4); *Bignonia capreolata* (1), (4); *B. littoralis* (1), (4); and *Amphilophium Mutisii* (10); or the suckers are pre-formed structures present as small swellings at the tips of the branched tendrils, and are simply excited to further development by contact, e.g. *Vitis inconstans* (1), (4), (8); *V. ternata* (10); and *Aptolophium* (1), (2), (3). Adhesive tendrils, though they all seem to agree more or less in being negatively heliotropic, i.e. in inclining away from light, show their predilection for a particular substratum. Some, like *Vitis hederacea* and *V. inconstans*, can climb up smooth walls and even planed wood, glass, and smooth polished iron, and form their discs upon these surfaces. Others like *Bignonia capreolata* require rough uneven surfaces, and seek crevices and crannies of stem and bark, and actually creep into them and there swell out into a club or ball and sometimes even fill up the cracks (1), (4).

Darwin (1) has given a pretty elaborate account of the tendrils of *Bignonia venusta*. They are modifications of leaves (Fig. 1). Each leaf consists of a petiole (P, P') with two lateral leaflets (LL, L'L') and ends in a tendril which is formed by the metamorphosis of the three terminal leaflets. Like the tendrils of *Bignonia unguis-cati* Linn. and some other Bignonias it has

a fanciful resemblance to the leg and foot of a small bird. 'The lower part, or tarsus (T, T') is four times as long as the three toes (a, b, c and a', b', c'); these are of equal length and diverge equally, but do not lie in the same plane; their tips are bluntly hooked, and the whole tendril makes an excellent grapple' (1). Kerner and Oliver (4) liken the claws at the ends of the delicate tendrils to those of insects' feet. Darwin also describes the manner in which the tendril seizes the support, but, it seems, his observations are restricted only to instances in which the tendril seizes an object which it can clasp by twining round it, for he makes no mention whatsoever of the peculiar cellular outgrowths or cushions which the present writer has seen to be produced on the tendrils under certain circumstances. The author's attention was first drawn to these structures by accident on a plant which was growing on the venetian verandah of his residence. The climber had been trained some distance up the outer side of the verandah on a frame-work of thin wire. Higher up it was left to find its own way. In a short time some of the branches grew inwards into the verandah through the venetian blinds. On an examination of these inwardly growing branches a number of irregularly-shaped pads or cushions about 10-15 mm. in diameter and 6-8 mm. in thickness and of a creamy colour slightly tinged with green were noticed at the ends of the tendrils (Figs. 2 and 3, D). These masses adhered firmly, as if cemented, to the inner angles of the venetian shutters and looked like wax which had been poured round the edges of the slips of wood composing the blind and had solidified. On a further investigation it was found that some of the tendrils that had crept into the crevices of the venetian woodwork also showed a development of a similar tissue so that they could not be readily withdrawn, and, where the tendrils clasped a split bamboo post which presented many projecting points and fibres and fine crevices, the hooked ends developed into small irregular discs 1-2 mm. in diameter which adhered firmly to the rough surface of the post.

The adhesive pads of *Bignonia venusta* may appear separately on each of the three branches of the tendril should each of these meet with the requisite type of support (Fig. 2), or the outgrowths of branches (toes) of a single tendril or of two distinct tendrils may unite in a single mass (Fig. 3). Should a tendril or any of its branches not meet with a support it dwindles down and dies. But such free tendrils or their branches are frequently found embedded in the adhesive pads produced by a neighbouring tendril or branch of tendril (Fig. 3, b). Such encased tendrils can often be recognized by the hooked tips which may be seen projecting beyond the pad and which show no indication of swelling. There is reason to believe that the tendency to form pads is not restricted only to that branch of the tendril which meets with the type of support calculated to cause the development of the adhesive masses, but the stimulus to form such masses is transmitted to the other branches of the tendril which also develop similar outgrowths on clasping supports, such as wire, tendrils, stems, etc., which do not ordinarily cause the formation of adhesive pads. As regards their tropisms, observation points to the fact that the tendrils of *Bignonia venusta* are not negatively heliotropic as are the adhesive tendrils of most of the other plants mentioned herein. They have been seen to point indifferently in all directions irrespective of the source of the illumination. In regard to the type of support suitable for the formation of adhesive cushions or pads it is obvious from the foregoing that bodies presenting a surface with a certain degree of roughness can stimulate the formation of pads. Smooth walls, window panes and similar surfaces seem to produce no impression whatsoever on the tendrils which have been seen to droop and die in spite of being in constant contact with these surfaces, unless, however, they come across a support which they may clasp.

To summarize:—

Adhesive tendrils have so far been definitely known to be produced in the following plants:—

AMPELIDACEAE:—

Vitis hederacea Ehrh.,
V. inconstans Miq.,
V. capreolata D. Don.,
V. ternata Baker,
V. assamica M. Laws.

- CUCURBITACEAE:— *Sicyos angulata* Linn.,
Hanburia mexicana Seem,
Trichosanthes pubera Blume,
Peponopsis adhaerens Naud.,
Gymnetalum cochinchinense Kurz.
- BIGNONIACEAE:— *Bignonia capreolata* Linn.,
B. littoralis H. B. & K.,
B. venusta Ker-Gawl.,
Amphilophium Mutisii H. B. & K.,
Aplolophium (Cham.) sp.

The tendrils of *Bignonia venusta* behave like ordinary tendrils when they come across supports which they can readily clasp—sticks, wire, etc. They form adhesive cushions, however, on contact with a body presenting a somewhat rough surface. The stimulus to form adhesive structures seems to be transmitted from branch to branch of a tendril. The inclination of the tendrils is independent of the direction of the light.

The writer's thanks are due to the Rev. Fr. J. F. Caius, S.J., of St. Xavier's College, Bombay, for his kind help in determining the synonymy of the plants mentioned in the paper, and for his valuable suggestions which have been embodied herein.

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EXPLANATION OF FIGURES.

- Fig. 1.—Portion of a branch of *Bignonia venusta* Ker-Gawl. showing two opposite leaves and their tendrilar prolongations. P, P', petiole; LL, L', L', lateral leaflets; TT', tarsus; a, b, c, a', b', c', toes.
- Fig. 2.—Portion of a branch of *Bignonia venusta* Ker-Gawl. the development of adhesive pads D, from two branches (a' & c') of a tendril. The rest of the lettering as in Fig. 1.
- Fig. 3.—Portion of a branch of *Bignonia venusta* Ker-Gawl. showing union into a single mass (D) of outgrowths of the branches of two opposite tendrils. Lettering as in Fig. 1.

REVIEWS.

I. AN ABRIDGED CATALOGUE OF CERTAIN SCUTELLEROIDEA (*PLATASPIDAE*, *SCUTELLERIDAE* AND *PENTATOMIDAE*) OF CHINA, CHOSEN, INDO-CHINA, AND TAIWAN. By W. E. HOFFMANN, Lingnan University Bulletin, No. 7 (1935).

The Catalogue of the Rhynchotan order Scutelleroidea by Dr. W. E. Hoffmann contains an admirably arranged list of genera and species of China and the neighbouring faunal subregions. It is an enlarged edition, with a great deal of additional material of the check list of the order published by the author in 1932. In 1909, Kirkaldy compiled a complete list of the World fauna of the group. Hoffmann's Catalogue makes an addition of 11 genera, 86 species and 12 varieties to Kirkaldy's list of 142 genera, 362 species and 20 varieties recorded from this region. To make the list as complete and up-to-date as possible, the author found it necessary to include two chapters of 'Additional species' and 'Addenda and Corrigenda' in the Bulletin. Throughout the catalogue he has followed a uniform method of arranging the genera phylogenetically and the species alphabetically following Kirkaldy's catalogue. As earlier literature is all listed in Kirkaldy's catalogue, Hoffmann has mainly confined the literature citations to works published after 1909. The geographical distribution of the various species is given in great detail. The 'Alphabetical list of genera and species' in conjunction with the 'Index to the genera, species and varieties' published at the end of the volume facilitates the location of different species, more particularly as the old names and synonyms are also indexed.

The very useful annotations added to the detailed bibliography fully define the exact scope of the different papers, monographs, catalogues, etc. and should enable students consulting the catalogue to determine the value of various references.

Appendices I and II contain notes on Faunal Sub-regions of Eastern Asia with special reference to China, and remarks on the Zoogeographical items with the aid of maps and the alphabetical list of about 600 place-names in Eastern Asia classified into general sub-regions, should prove very useful for workers in understanding the distribution of the species of the group; this is of special value as the names of many places, in China particularly, are not easy to find on maps that are generally available to most workers.

A cursory glance through the list of species shows the large number of species which are common both to India and China, and as the last volume of Distant in the *Fauna of British India* series was published in 1918 the present catalogue should prove very helpful to workers in India.

B. P.

II. THE SNAKES OF INDIA. By K. G. GHARPUREY, I.M.S. Demy 8vo. Pp. x+165; 29 diagrams, 52 illustrations. (The Popular Book Depot, Bombay) 1935. Price, Rs. 3.

It often happened in the past that in aristocratic families the eldest son was a kind of privileged being, whose future was being carefully planned and at times entailed sacrifices which were bound to affect his younger brothers who were supposed to shift for themselves. A similar spirit of favouritism obtains even nowadays among the scientific brotherhood, whose members write for their fellow-scientists and apparently do not care for those unfortunates who belong to the unscientific crowd! Hence the author is to be congratulated on having produced a popular book giving general information and useful knowledge about the various common snakes of India. Scientists may perhaps object that the book could have been written on other lines; but, if they do so, they lose sight of the author's aim which is essentially pragmatic—to let

knowledge reach as many persons as possible. Accordingly the book has been priced at Rs. 3, which is a record-breaking low price for an illustrated book on snakes.

The author himself tells us that there is hardly anything original in this book and that the information it contains has been collected from diverse sources and put together without its being made too technical. But if the book is not original in this sense of the word, it is nevertheless an interesting production which well fulfils the purpose intended.

The opening chapter gives general information about snakes, and is followed by a short note on animals confused with snakes—an excellent idea this. Various points, such as Teeth and Poison-glands, Snake Poison, Scales on a Snake, Classification of Snakes, Identification of Snakes, Protection against Snakes, Treatment for Snake-bite, are dealt with separately and form the subject of as many short chapters. By far the greater part of the book is devoted to the description of Indian Snakes. All through the style is simple without being obscure, and the matter is condensed without being jejune.

It may be noted that *serpens* is Latin, not French, and that *kattuvirian* is the Tamil for the Indian Krait and not for the Echis which is known as *suruttaippambu*.

In the reviewer's opinion it is regrettable that the author should on several occasions have made use of the word 'variety' instead of 'species'. The two words are not synonymous, and *species* is such a common word that it cannot be objected to in a popular book not strictly scientific.

J. F. C.

III. THE NIDIFICATION OF BIRDS OF THE INDIAN EMPIRE. By E. C. STUART BAKER, C.I.E., O.B.E., F.Z.S. Vol. IV (Taylor & Francis, 30/-).

It is with mixed feelings that one sits down to write the review upon this, the concluding volume, of Mr. Stuart Baker's great work, for to the reader, no less than to the author, there must always be a certain feeling of sadness when the word 'Finis' comes to be written.

On the other hand, it is a matter of supreme satisfaction that the final word has been written by Mr. Stuart Baker's own hand, and that he has been spared to place the coping stone upon the edifice, the foundations of which he laid half a century ago.

In tendering him our hearty congratulations, may we also add that it is characteristic of the author, and of his devotion to the cause of Ornithology, that he kept to the last the writing of this work which, one feels, has always been nearest and dearest to his heart.

For in addition to his innumerable contributions to Ornithology in the pages of *The Bombay Natural History Journal*, *The Ibis*, and elsewhere, and his volumes on the Indian Ducks, Pigeons, and Game Birds, it was not until he had completed his masterly revision of the Birds of the Indian Empire in the *Fauna of British India* series, that he embarked upon the work under review, which he has now brought to a successful conclusion.

In his preface to Vol. IV, Mr. Stuart Baker tells us that the *Fauna* deals with no less than 2,351 species and sub-species, of which the breeding of 1,723 species and sub-species is recorded in the present volumes. Of the residue, 349 are known to breed in countries outside the Indian Empire and Ceylon, whilst there remain 279 concerning whose nidification nothing whatever is known.

To the author, this figure of 279, or approximately 12 per cent, may appear large; to us, and we venture to say to our readers, it is well nigh incredible that it should have been possible to record, with such accuracy, the nidification of nearly 75 per cent of the total within Indian limits.

In this connection, may we express the hope that Mr. Stuart Baker may find it possible, in contributions to this *Journal*, to indicate where and when to look for the nests of some, at least, of the unknown 279? To give an example, the nidification of the Masked Finfoot (*Heliopais personata*), recorded on pages 316 to 318 of the present volume, was discovered at the first attempt in 1920, when two keen field workers happened to be located in one of the

breeding areas of this bird, but it is quite possible that it would have escaped them but for the hint obtained and recorded by Mr. Stuart Baker as far back as 1904.

The present volume commences with accounts of the breeding of the whole of the Birds of Prey, other than the Owls, which were included in Volume III, and continues with the Pigeons and Doves, Sandgrouse, Game Birds, Megapodes, Bustard Quails and Quails, Rails, Waders and Waterfowl, and as in the earlier volumes exactly follows the classification of the *Fauna*.

The author also continues his system of trivial nomenclature, which indicates, in the English name, the habitat, appearance, or some other distinguishing peculiarity of the bird, a system which, we learn, has been very greatly appreciated not only by the general public, who are apt to boggle at long Latin names, but also by the scientifically minded.

Throughout the book, Mr. Stuart Baker maintains the same high level which he has set himself in the previous volumes, and when he permits himself the luxury of an occasional page of descriptive writing, he gives us a vivid word picture of a Himalayan mountain side or a Burmese jungle which adds immensely to the charm and interest of the work.

As in the earlier volumes, the author has collated all the older material, and to this has added a very great deal that is new, the whole being presented in his inimitable and eminently readable style. We give it as our emphatic opinion that no field ornithologist can afford to be without this magnificent work, quite apart from its value as a contribution to Ornithological Science, and its appeal to all those interested in Indian bird life.

The book is illustrated by seven beautiful photographic plates, and the printing is once again all that can be desired, and very easy to read. We would also add a word of praise for the great care which has evidently been expended upon obtaining the correct spelling of the innumerable place names which occur throughout.

C. H.

OBITUARIES.

OSMOND CHARLES OLLENBACH.

Osmond Charles Ollenbach, formerly of the Survey of India, died at Mussoorie on the 6th July, 1935, aged 66 years.

Mr. Ollenbach was perhaps the doyen of Indian butterfly collectors, a fraternity which was in its hey-day in the more spacious times before the Great War. He himself used to comment on the decline of the hobby in India and attributed it partly to the lack of leisure and the more rigorous demands made upon people's time by the exigencies of life in the present day. Many enthusiasts had also left India on retirement and there were few to take their place.

Attracted to butterflies from childhood, Mr. Ollenbach took up the hobby of collecting as a boy in school, at Mussoorie. In those days the absence of works on the subject hampered serious study, but by the time he entered the Survey of India he found that opportunities for observing and collecting had so much improved that in 1900 he determined to start collecting seriously. In the next thirty years he captured and set about 17,000 specimens, comprising some 1,400 species, all of Indian Empire origin. To museums and learned societies in many lands he gave away 3,000 specimens and to other collectors over 5,000. The number now in the unique personal collection that he has left is roughly 9,000. They are most carefully preserved and scientifically classified in airtight cabinets, which Mr. Ollenbach loved to show to privileged visitors. Among those who saw his collection was Brigadier W. H. Evans—the noted authority on Indian Butterflies. In a letter to the Society, Brigadier Evans writes: 'I had corresponded with Ollenbach for many years but did not meet him until 1921, when our paths crossed in Burma. In 1922 I paid a visit to Dehra Dun and saw his collection not only of Butterflies but of insects of all Orders and I was very much impressed.'

Mr. Ollenbach's service years were spent in all parts of India, including Burma, the Andaman and Nicobar Islands, Kashmir, Hazara and the Himalayan region from east to west, and also Ceylon and Turkestan. In all these regions he had boundless opportunities of indulging in his hobby and more than once was helped by fellow-officers or friends who were keen naturalists.

Ollenbach was most generous in assisting other collectors and in presenting unique specimens to the Society's collections and to the South Kensington Museum. His knowledge of the habits of butterflies all over India and Burma were immense. Unfortunately he rarely wrote; but the Society has to thank him for several important notes and a comprehensive account of the Butterflies of Tavoy. Mr. Ollenbach also contributed articles and notes to Records of the Forest Department. Subsequent to his retirement he was employed as an Entomologist at the Forest Research Institute, Dehra Dun. After retirement he settled on

his own estate at Dehra Dun and took a great deal of interest in his orchards. He leaves a widow and two sons.

WALTER ORMISTON.

Walter Ormiston was born in Hongkong where his father was the Manager of the Chartered Bank. He was educated at Rugby and after passing out as a Barrister at Lincoln's Inn, he practised at Hongkong. Finding the work uncongenial he gave up his profession and went to Ceylon where his family owned the Kalupahani Estate, at Keslande. He worked on the estate up to the year 1925, when he returned to Galle and made the Oriental Hotel his headquarters.

Ormiston was a born naturalist, his love of Nature and the out of doors, drew him away from the vocation for which he was trained. A keen fisherman—one of the most expert in Ceylon, he was the oldest member of the Nuwara Eliya Fishing Club. Animal and bird life attracted him. His observations were always wonderful; and as such he was a welcome and charming companion on shooting trips. He handled a rifle as cleverly as he handled a rod and was a keen member of the Ceylon Planters' Rifle Club. Stamp collecting was also one of his hobbies and as a collector he mastered the intricacies of his hobby and became an expert philantelist. But his chief claim to remembrance amongst naturalists will lie in his work on the Butterflies of Ceylon which he published in 1924. His experience as a collector and his close study equipped him for the task. He was in close correspondence with noted lepidopterists such as Brigadier Evans, Capt Riley and T. R. Bell. His work was based mainly on the collections which he made in Ceylon. They include long series of each species illustrating both dry and wet season forms and other variations. In writing his book he spent some time studying the collections at the British Museum. He gave the British Museum such Ceylon Butterflies as were unrepresented in their collection, besides many rare and abnormal forms. But the bulk of his collection of his Ceylon Butterflies he presented to the Bombay Natural History Society of which he was a member for twenty-five years. They are now preserved in separate cabinets as the 'Ormiston Collection'. His work as an entomologist will be remembered in the new species which have been named after him, this includes one species new to science named by Evans and Riley as *Amblypodia ormistoni*, two new races *Vacaduba herenice ormistoni* and *Terias andersoni ormistoni*. He died in the General Hospital at Colombo on July 12th, 1935, aged 71 years.

MISCELLANEOUS NOTES.

I.—TIGER VERSUS BISON.

With reference to a note in vol. xxxvii, No. 4 of 15th April 1935, anent a fight between a bull gaur and a tiger, Mr. W. S. Thom is mistaken in thinking that a tiger is no match for a full-grown bull bison. I have known at least six cases of solitary bulls having been killed by a tiger; about as many instances of unsuccessful attacks, including that of an old bull which had been severely mauled on its head, neck and shoulders and the near hind leg bitten through, the bone being completely severed. How this bull had managed to shake off the tiger after such a terrific mauling is difficult to imagine.

HONNAMETTI ESTATE,

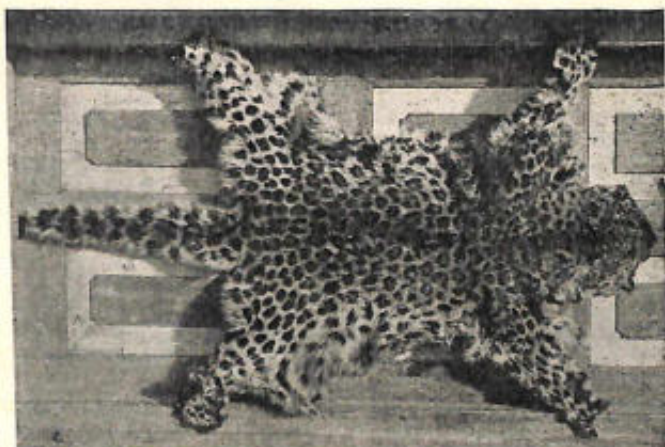
ATTIKAN P.O., *via* MYSORE,

S. INDIA.

July 12, 1935.

R. C. MORRIS.

II.—OCCURRENCE OF THE PANTHER (*PANTHERA PARDUS* LINN.) IN TIBET.



Skin of a panther shot at Thakpo, Tibet.

The accompanying photograph is of the skin of a panther said to have been killed in Thakpo which is in the Tsang Po valley,

Tibet. The only difference I noticed between this one and the common Indian panther is that the colours are richer, the hair thicker and slightly longer and the tail broader but shorter. Unfortunately the skull was not brought in to me.

POLITICAL DEPARTMENT,

LHASA.

September 29, 1935.

R. K. M. BATTYE,

Captain.

III.—FURTHER RECORDS OF THE DISTRIBUTION OF THE CHEETAH (*ACINONYX JUBATUS* ERXL.) IN SOUTH INDIA.

With reference to my recent letter to you about the occurrence formerly of the hunting cheetah (*Acinonyx jubatus*) in South India I see from the list of *Mammalia* taken from an article written in 1875 by the Rev. F. W. Jackson entitled the 'Mammals of the Coimbatore District, 1875', that the hunting cheetah was then sparsely distributed in parts of the Coimbatore District bordering the river Bhavani near Vellamundi and Kottamangalam. Five skins of *Felis jubata* examined in the Coimbatore Collector's Office in 1871 apparently came from the low hills about Kottamangalam (near Satyamangalam). The skins are described as having been 'in good order and undoubtedly those of *Felis jubata*'. The skin of a *Felis jubata* then in the possession of Mr. A. Wedderburn, Collector of Coimbatore, was obtained near Bolampatti, south of Coimbatore. I have already given instances of the hunting cheetah's former occurrence in the Mysore State, so you will realise that the distribution of the cheetah extended southwards well into the Coimbatore District, possibly further south than that.

Nicholson, in his *Manual of the Coimbatore District* (1887) records the Hunting Leopard as occurring in the Kollegal taluk at Bandhalli and in the Mysore State at Bandipur.

HONNAMETTI ESTATE,

ATTIKAN P.O., via MYSORE,

S. INDIA.

November 1, 1935.

R. C. MORRIS.

IV.—DESCRIPTION OF A BLUE BEAR (*URSUS* *ARCTOS PRUINOSUS* BLYTH) FROM TIBET.

A skin of a Blue Bear (*Ursus arctos pruinosus*) was sent to the Society in November 1935 by Captain R. K. M. Battye, who in forwarding the skin writes: 'The bear is said to have been killed near Hor in Eastern Tibet. I am told that the species lives only in the bare mountains where there is no jungle and where there is snow lying for 7 months in the year. Vernacular *Tre-Mo* or *Tom-Dre*.'

The skin is that of an immature animal, in general colouration it resembles the skin of an immature male from the Minshan Mountains, W. Kansu, presented to the British Museum by Capt. O. Fenwick Owen and described by Pocock (*J.B.N.H.S.*, vol. xxxv, p. 809).

Face, pale tawny, with a silvery sheen where the light catches the hairs. The basal portion of the hairs of the crown, cheek and forehead is dark brown, but this dark colouring is not seen unless the hairs are disarranged. A small patch of hair between the eyes brown; chin brown, ears dark ashy brown with an admixture of fulvous hairs. A distinctive collar of creamy hair interrupted in front of the shoulders where the dark basal part of the hair becomes more evident. The black of the shoulder mat is not very pronounced owing to the pale tipping of the hairs. This paling becomes more evident in the middle of the back, but is less pronounced on the loins flanks and rump where the pale tipping of the hair is less marked. Belly dark brown passing to yellowish brown on the breast. Limbs grizzled black. Claws pale, horn coloured. Fore claws $2\frac{1}{2}$ inches, hind claws $1\frac{1}{2}$ inches. Hair on the shoulder mat 4-5 inches, on the back 3-4 inches.

BOMBAY NATURAL HISTORY SOCIETY,

S. H. PRATER,

6, APOLLO STREET, BOMBAY.

Curator.

February 12, 1936.

V.—RATELS AND CORPSES.

Mr. Clifford Hurst's letter in your issue dated December 1st 1935 brings the grave-digging habit of the Ratel out of the realms of 'Indian Superstition' to which Mr. Champion would relegate it.

A detailed enquiry amongst those whose business it is to deal with corpses, would further establish the Ratel's habits; and possibly more of your readers, whose business naturally does not lie in that direction, may nevertheless have come across isolated instances of grave-digging.

Mr. Champion has replied to my letter on the subject in a letter of his published on page 953 of your Volume xxxvii, No. 4.

A few comments on Mr. Champion's letter are called for, both personal and general.

In my letter to which Mr. Champion's purports to be a reply, I quote the case of Ratels habitually excavating in a grave yard and I gave a particular instance in which a Ratel (no other animal) had exhumed a corpse.

I expressly stated that this was only 'some' of the evidence at my disposal. Mr. Champion for his own convenience converts this to the 'only' evidence and finds it 'deplorable' that I should make statements on such flimsy foundations.

The foundations are entirely of his creation for the special purpose of trying to meet an unanswerable case: moreover he entirely ignores the cemetery evidence: wisely.

Many people reading Mr. Champion's letter would conclude that he had hardly ever seen or encountered a Ratel, although his trip wires certainly have.

The letter contains no particle of evidence or observation whatsoever of any kind: much less in repudiation of the habit he denies. It goes further than that: it admits that he has never observed a grave yard: and definitely asserts that he does not intend to do so in future. One is thus left wondering how he proposes to support his contention: save by a process of transmigration. He certainly cannot observe corpses save where corpses are. It is time Mr. Champion told us when and where and under what circumstances, he has encountered Ratels, if at all, which give the lie to observed facts in regard to their habits: and in doing so he would gratify many, if he would tell us also of his personal experiences of the Ratel's courage, and which enabled him to confound his critics from a Bombay paper to which he refers.

BISHOPMILL,

ELGIN, SCOTLAND.

January 6, 1936.

A. A. DUNBAR BRANDER,

I.F.S. (Retd.).

VI.—RATELS AND CORPSES

With reference to the correspondence which has taken place in your *Journal* about Ratels and corpses, I should like to report the three following instances on which I saw Ratels at this work:

(1) In the Melghat Division in April 1926, I was sitting over a tiger kill two days old. In those days, one was allowed to sit up all night with an electric apparatus. I actually shot the tiger about 40 yards from the kill at 7-30 p.m. Being of the opinion that there was another one in the vicinity, I remained on in the tree. At some time between 11-30 and 12 midnight, I heard a noise which sounded like two animals fighting. It was a bright moonlight night and I saw movement near the carcass and watched these forms tearing and rummaging inside the carcass and fighting amongst themselves. I turned on my electric torch, as I was unable to make out what they were and discovered them to be a pair of Ratels. One looked up into the light and moved away about 20 yards, the other did not take the slightest notice. I picked up my shot gun which was loaded with lethal and tried to change over to shot, but the noise drove the animals away. They did not reappear.

(2) In the Chakata Block of the Haldwani Division in December 1928, I was 'glooming' in the early morning in the hope of finding a tiger or a panther on one of the tie-ups, or meandering about the road. I moved into a dry river bed (Nala) and about 200 yards off the forest track I got an odour of a carcass. In moving forward round the bend of the Nala which was all sand, I noticed a lot of tiger pug marks and saw about 60 yards away two Ratels scratching and scraping at something in the bed of the nala. I watched them for quite a long time. The earth flew and they seemed to be feeding on something dead, as the odour was pretty strong even where I was. After about 10 minutes, I shot one of these animals and on going up to see what it was, discovered it to be a human corpse which had been covered over with about 6 inches of sand. The part about the neck and the left shoulder had been torn and eaten by these Ratels. The remainder of the corpse was a good deal decomposed, and there was no doubt about it, that these Ratels had exhumed this body and were feeding on it.

(3) My third instance took place in the Jaulasal Block in the Haldwani Division in April 1933. I was wandering about on an elephant at dawn, and was shown by the mahout a Ratel moving across an open patch between two bits of forest. I watched the beast very carefully and suddenly I heard a noise as if there were more Ratels quite near. I told the mahout to make the elephant advance very slowly and quietly. After having gone about 20 yards I saw four Ratels on an old carcass of a cheetal doe. One was actually inside the carcass which was, I should say, three to four days old. Suddenly one of them saw the elephant and gave a queer little yelp and they all ran away. I did not move from the spot for about 10 minutes in order to see if they came back. The time must have been somewhere between 6-30 and a quarter to seven. To my amazement, two of the four returned and advanced slowly towards the carcass. They never reached it again, because I think they must have caught sight of the flap of the elephant's ears, as they disappeared very suddenly.

GOVERNMENT HOUSE,

BOMBAY.

January 25, 1936.

C. G. TOOGOOD,

Lt.-Col., D.S.O.

VII.—THE BIRTH OF AN ELEPHANT CALF.

With reference to Mr. Tutein Nolthenius's note under the heading of 'The Birth of an Elephant Calf' in the *Journal* of August 15th, in vol. xxxvii, No. 3, I referred to the death of a wild elephant while calving. This elephant was found dead lying on its left side with the hind quarters of the calf only exposed.

On another occasion I happened on a spot where a cow elephant had calved on a sandy path in open scrub jungle; there was no sign of the placenta.

HONNAMETTI ESTATE,

ATTIKAN P.O., *via* MYSORE,

S. INDIA.

September 3, 1935.

R. C. MORRIS.

VIII.—WHY ELEPHANTS TURN 'ROGUES'.

I wonder if any of your members has any information as to the real reason for elephants turning 'rogue'. The usual theory is that some old and cantankerous elephant is turned out of the herd, specially during the 'musth' or rutting period, by a more powerful male, and this old and ill-tempered fellow gradually becomes a confirmed 'solitary', and in time becomes dangerous to human life and property. My experience in the Chittagong Hill Tracts (on the borders of Bengal, Bihar and Assam) leads me to question this, for on at least three occasions, I was attacked by well-known 'rogues' which after being shot turned out, in spite of their commanding size, to be quite young fellows, with no signs of wounds or injuries likely to cause them pain or discomfort, which might turn them soured in temper. One fellow who very nearly got me, was quite small, standing barely seven feet at the shoulder, and must have been only a young lad, yet he had been by himself for months, in the plains during the rains, when all herds were away among the higher ranges. Every rogue I shot myself, and every other which was shot by others, and which I had the chance to examine, had undoubted need for a dentist for at the root of the tusks of each one of these animals, I found pounds and pounds of live maggots, which must have caused them excruciating agony. I am inclined to think that it is this tusk-disease, which makes them, young and old, so bad-tempered, and forces the others to kick them out of the herd. Whenever tracking a 'rogue' or 'solitary' (undeclared rogue), I have noticed that the animal frequently thrusts his tusks through ant-hills, or soft saplings, and as I have never seen the marks of tusks thrust through in this manner when a herd has passed, nor have I seen our tame elephants doing this, I feel that I am not far wrong in holding that they do this in order to relieve the agony caused by the maggots far inside their jaws. During my stay in that area, I tracked and followed up herds and solitaires—literally by the hundred, so my observations were not quite casual, and were spread over a period of nearly four years. I hope this may bring some light on the matter.

RANGPORE,

E.B.R.

August 2, 1935.

S. K. GHOSH, I.C.S.,

District Magistrate.

[Mr. R. C. Morris comments on Mr. Ghosh's letter as follows:—

'While agreeing with Mr. Ghosh that in many cases tusk disease is the cause of many elephants turning into rogues, this is by no means the cause in all cases, in fact most of the elephants I have shot or helped to shoot had no apparent disease in the tusks. Marginal *gum* disease of elephants is very common, occurring in the case of both wild and tame elephants, probably due to food packing under the gum, but this would not account for elephants turning into rogues. Frequently inflammation from old and fly-blown wounds may be the cause (the last rogue I shot had had its tail bitten off and the stump was diseased). Again in some cases there is no apparent reason for the elephant having become a rogue. In two cases this was undoubtedly due to the elephants' tusks being crossed, resulting in difficulty in feeding. Only in two cases was I sure the elephants' ill-temper was due to tusk disease. That elephants with tusk disease do thrust the diseased tusk into ant-hills and young trees is correct. A broken end of a tusk, about a foot long, was brought to me some years ago, the Sholaga had found it wedged firmly into a tree, and Sir Frank Colyer, to whom I sent the tusk, expressed the opinion that the elephant had been suffering from tooth-ache.

Seven or eight rogue elephants have been shot in the Madewaranmalai Reserve in this district in the past ten years, one of these was definitely handicapped having tusks crossed so close to its jaw that the elephant must have experienced considerable difficulty in feeding itself, but the others were healthy animals, and I put their ill-temper down to the fact that their favourite grazing grounds bordered a much-frequented pilgrim patch up to the famous Madewaranmalai temple. Nearly every day, devotees journeying up and down this path create a good deal of noise, especially once a week, and I think that this continual row used to irritate solitary elephants frequenting the bamboo jungle there. In every case the elephant was proscribed owing to its adopting an aggressive attitude towards pilgrims on this path.

I am convinced that one of the chief causes of elephants turning into rogues now-a-days is due to ryots firing at elephants raiding their fields. The herds are nearly always led by a bull. The ryots, who now nearly all have guns, cannot be blamed for their action in this respect, and it is up to Government to create a Game Department, which will take measures to prevent the continuous raids on fields that are now carried on during the harvest time by the increasing number of elephants.—Eds.]

IX.—THE FORMATION AND ABSENCE OF TUSKS IN ELEPHANTS.

With reference to Sir Frank Colyer's article in the Society's *Journal* of 15th November 1930, and my comments on the same which appeared under 'Unrupted tusks of Elephants' in *Journal* 4, vol. xxxv, I enclose extracts of further correspondence on the

subject between Sir Frank Colyer and myself which may be of interest.

*Extract from a letter dated 11th November 1934 from
Sir Frank Colyer.*

'It is a most unusual condition for an animal to have one tooth absent and the other well developed. It does occur in the Narwhal but in that animal it is the normal. The tusk in many Indian elephants seems to be a degenerate organ. Is that not the case? That is, do not a good number of elephants fail to develop tusks? Is it only the females? Have the calves which have shed a tusk been followed up to see if the tusk which develops on the other side is a well-formed and grown tooth? It is most important to settle this question. I take it that in your view many elephants which have only one developed tusk have at some time possessed another small tusk which was shed in early years. Further you think that masses such as you sent me may really be formed from a tooth germ which has failed to produce a tusk in the proper way but has formed a shapeless mass which is retained in the bone. It may be so but, judging from similar conditions which I have seen in other animals, and they are very rare, the mass of hard tissue formed is not tissue which approaches to the structure of the normal tooth.

I have had another good look at the specimen you sent to the Museum and have discussed the tooth with some of my friends and we still think that it is not an aborted tooth but is the remnants of the formative parts of a tusk which was once in position. If you can prove that elephants which shed one tusk as calves develop really well-developed tusks then you have something to support your contention. I had a long talk to Major Powell-Cotton, a Big Game hunter and collector, and who has seen plenty of elephant life in Africa. I put the question of the frequency of tusks with severe fractures in a longitudinal direction and he remarked that such conditions were to be expected when one realised the way in which the African elephant used the tusks for breaking trunks of trees etc.

I see that the "erosion" of the female tusk does occur in the animal from the wild state. The case described by Selater in 1871 was from a wild animal. If you do obtain another mass from a single tusker and will send it to me I will have it cut in two, examined and returned to you.'

Extract of my reply dated 29th October 1935.

'In your letter you put forward two or three queries, and you expressed the opinion that the tusk in many Indian elephants seems to be a degenerate organ, which would certainly seem to be the case as quite a number of male elephants fail to develop tusks and in Ceylon of course tuskers are uncommon. It is my view that many elephants which have only one developed tusk

were possibly born with only one tusk, or when their "milk tusches", as it were, were shed they were replaced by only one instead of a pair of tusks. I had some correspondence on the matter with Mr. Gordon Hundley of Steel Brothers & Co., and one of the Bombay Burma Trading Corporation men. Both these Companies maintain, as you no doubt know, a large number of elephants, several thousand in fact. Gordon Hundley informed me that calves have been known which developed into single tuskers and referred me to Evans's work on *Elephants and their Diseases*. He also told me an interesting thing; that ivory thieves used to steal whole tusks from a living tusker by repeated blows on the point; after a certain period the tusk so maltreated can be removed or is shed. Also that one type of tusker will "cut through" a large tusk in a comparatively short time by continually "knocking" a trunkful of grass against one of his tusks.

Evans in his *Elephants and their Diseases* records a case where an elephant dropped a male calf which grew up with only one tusk. He also states that Selous recorded it as far from uncommon to meet with one-tusked animals among elephant cows in South Africa, though rarer among the bulls; and when an elephant has only one tusk the bone on the other side is quite solid and shows no sign of a hollow where the hollow ought to be. This has exactly been my experience, and you will recollect my informing you of this myself in regard to Indian single tuskers. Evans goes on to say that "Males occasionally lose a tusk when fighting or through other injury but some are born with a single tusk". Evans disagrees with Sanderson in the latter's statement that the first tusches of a bull elephant are never shed and says that on the contrary the milk tusks are shed between one and two years of age and replaced by the permanent ones.

If I do obtain another mass from a single tusker I will certainly send it to you.

Evans in his classical work on elephants mentions instances of mucknas (tuskless males) being feared even by powerful tuskers. This of course is well known among the jungle tribes both in India and Burma; mucknas seem to make up in size of body and trunk for the lack of tusks and are generally enormously powerful elephants. In fights between mucknas and even large tuskers as often as not the tusker will be defeated. Evans quotes a case of a fight between a good-sized tusker and a large muckna which was well known in the Shweli forests of Burma. During the course of the battle the muckna snapped off one of the tusks of its opponent with its trunk. A somewhat similar instance is recorded of a fight between a muckna and a tusker in which the former was seen to seize and break off one of the tusks of its antagonist.

HONNAMETTI ESTATE,

ATTIKAN P.O., via MYSORE,

S. INDIA.

October 29, 1935.

R. C. MORRIS.

X.—HORN GROWTH AS OBSERVED IN BLACK-BUCK AND NILGAI.

I have always been under the impression that horns, by which is meant the outer horny covering of hollow-horned animals, grew without any break from early age to death in all species of *Bovidae*, e.g. Bison, Buffalo, Black-buck, Chinkara, Nilgai, Four-Horned Antelope etc. This at least is what I have read in most books dealing with Natural History, the solitary exception to the rule being the Prong-horn Buck of America; which annually sheds its outer horny covering of the bony core. Within the last two years however, four cases have come under my direct observation of partial shedding of outer horns, one case of Black-buck and three of Nilgai.

In the case of the Black-buck this is a perfect example of new growth of horns displacing the older horn from underneath and growing in the usual way. The buck when shot was noted as being immature, but carrying an exceptional head for his size. On examination this was found to be due to the lower and inner pair of horns having forced out an older and outer pair, which however had not been shed, but were still joined to the new pair. The joint is quite firm, the older pair of horns are splintered slightly at their junction through the forcing action of the new horn growth, thereby showing how the annular ridges of the lower horn fit perfectly with those of the outer horn. No doubt in the course of time by fighting, or otherwise, the older horns would have dropped off. This buck was shot in the Philibit District. The length of horns by straight measurement are right 21 in., left 21 in.; rather exceptional for the district where the average is 17-19 in. The outer horn-covering measures 16½ in. right and 15¾ in. left. Both horns are in my possession, though unfortunately the skull was cut down to form a small frontlet; my not being a very keen or expert field observer in those days. I kept the head out of curiosity and as something out of the usual.

In the case of Nilgai (Blue-Bull) which are fairly common in these parts (Behar), on two occasions I have noticed horns of old bulls covered with a sleeve of horny substance, evidently part of an outer horn casing in the process of shedding, such shedding taking place gradually by wear and not by the dropping of the entire outer casing. In my latest case however, I noted the horns of an old bull much splintered along their length, with indications that there were perfectly formed horns beneath the damaged covering. I took some pains about cleaning this head and now have a horn (right) showing very clearly how the outer covering is separated and shed from the newer growth; such shedding taking place along the entire length, and most probably assisted by the animal rubbing his horns against trees, bushes, etc. Length of right horn 8½ in. The left horn was unfortunately freed of the old covering by my servant, who misunderstood my instructions.

In view of the above-noted observations of mine I would be glad to know if any other sportsmen or naturalists have recorded similar cases.

BURMA-SHELL CO., LTD.,

MUZUFFERPORE, BENGAL.

J. E. HALL.

October 1935.

XI.—EARLY DEVELOPMENT OF ANTLERS BY SAMBHUR IN THE BILLIGIRIRANGAN HILLS, SOUTH INDIA.

There is an astounding number of sambhur on the Billigirirangan Hills, Kollegal and North Coimbatore Divisions, this year including many fine stags.

There are two interesting features in connection with the present increase in the number of sambhur, and here I may say that chital and bison have also appeared to have increased correspondingly. Many of the sambhur stags were in hard horn this year in August, which to my knowledge has not happened before within the past twenty years. By the end of the current month the remainder should be out of velvet. Further the sambhur seem to be unusually fearless this year. Time and again a group will trot off quietly on being approached and will then recommence grazing about 300 yards away. It is to be hoped that this is one of the first fruits of stricter game preservation, but I can hardly think this can be the case as yet. It would be extremely interesting to learn what actually governs the early or late shedding of antlers and growth into hard horn again, and what has caused stags to be in hard horn two months early this year. The increase in the number of large heads is remarkable.

HONNAMETTI ESTATE,

ATTIKAN P.O., via MYSORE,

S. INDIA.

September 6, 1935.

R. C. MORRIS.

XII.—WHITE BISON.

Mr. Morris asks where White Bison are to be found in the Central Provinces. The answer is the Mandla-Balaghat jungles and their associates and the Chanda District. This list is not prescriptive, it is only what I know of.

As Mr. Morris does not agree with me in thinking that 'dormouse colour' and 'sandy or light fawn' are interchangeable colours. I would be grateful to know in what terms he would describe 'dormouse colour'.

I take exception to Mr. Morris's remark that I admit in *Wild Animals in Central India* to not having much experience of Bison. Disparagement is generally evidence of a poor case. Such an admission on my part is a sheer impossibility, as I have lived amongst Bison throughout most of my service. As you, Mr. Editor, have given publicity to Mr. Morris's remarks, I would request an equal publicity to any quotation he can make, from anything ever written by me, which supports his statement, or as an alternative a complete and adequate withdrawal by him.

BISHOPMILL,
ELGIN, SCOTLAND.

A. A. DUNBAR BRANDER,
L.F.S. (Retd.).

January 6, 1936.

XIII.—MATING HABITS OF CROWS

With reference to the Miscellaneous Note xii (Mating Habits of Mynas and Crows), p. 186 of vol. xxxviii, No. 1, I may say that I have seen crows coupling twice in the normal manner of birds, in the afternoon at quiet spots where the pairs were by themselves on both occasions. I remember the incident because because one sees it so very rarely and because of a belief amongst the people of this part of the country, that such a sight foretells one's death within the next six months and, though one has no faith in such beliefs, it made me remember the incidents.

There is also a belief that crows hold a sort of council of their community—a lot of them are seen gathered together in a partial circle with one crow in the middle who is being chastised by two or three crows. The one so pecked at, receives his punishment meekly without any retaliation. The supposition is that the crow has committed some offence against the Crow-community and is so receiving his punishment quietly. I have seen such gatherings also. The Mynahs also have such small gatherings to witness the duels which occur then.

ICHALKARANJI,
September 5, 1935.

NARAYAN RAO BABASAHEB,
Chief of Ichalkaranji.

XIV.—EXTENSION OF THE RANGE OF THE WHITE-BROWED BULBUL (*PYCNONOTUS LUTEOLUS* LESS.).

The limit of distribution in the extreme east or rather north-east, of *Pycnonotus luteolus* Less. is given as Midnapur in the *Fauna* volumes. Mention of this is also made in Mr. Stuart Baker's *Nidification*, i, 398. Evidently this description is based on Tickell's original record (*J.A.S.B.*, ii, 573) from a 'woody and barren country at Bamireah, near Mednapur'. Blyth noted three specimens procured in 1847 in Midnapur jungles (*Cat. B. Mus. A.S.B.*, 210). So far as Western Bengal is concerned these

appear to be the only records available. Mr. Whistler, though he writes of this bird (*Handbook of Indian Birds*, 1935, 65) as common in Western Bengal, is silent as to whether it is found anywhere else than Midnapur. It is of interest to note that in my excursion to Satgachia (20 miles east of Burdwan town), district Burdwan on June 23, 1935, I came across this species affecting the scrub-jungles on and near the bank of the river Banka. I collected one specimen alive with the aid of a bird-catcher. I also found it rather common and fairly numerous in the neighbouring thickets and unfrequented orchards on the Kalna Road, where I collected a second specimen.

Measurements:

- No. 1. Apparently ♀ adult. Iris reddish brown. Bill somewhat slender. Wing 89 mm., tail about 88 mm., tarsus 23 mm., culmen 16 mm.
- No. 2. Juvenile in moult. Iris brown. Bill stout. Wing 86 mm., tail 87 mm., tarsus 23 mm., culmen 16 mm.

By nature these birds do not appear to be as bold as their congeners, *Molpastes h. bengalensis* Blyth. and *Otocompsa c. emeria* (Linn.), with which they were sometimes observed to consort together. Skulking and evasive, they try to avoid detection as much as possible and, only when uttering their lusty warbles, serve to reveal their identity either in high tree-tops or low bushes. It is possible to spot them by their call, but it is difficult to get a good view of them.

There is no doubt the species is distributed beyond its recorded limit, still further north-east. The locality where the first specimen was secured is obviously typical of its haunt in a scrub and bush country. Hedges and thickets stretch along to some distance but are not very dense. The neighbourhood where the second specimen was collected harbours numerous orchards and gardenlands (Burdwan Raj's Staging Bungalow is among them) mostly in disuse, with an array of prickly undergrowth and secondary jungle. Here towards evening I saw quite a number of these birds, often going about in pairs. On my approach they would slip out of view and seek cover in lofty trees, wherefrom they would pour forth their voluble notes.

Ecologically the whole of this locality has no doubt much in common with the deltaic alluvium of Central Bengal, nevertheless its proximity to the more open, undulating and arid zone characterising a large section of the district does not altogether leave it impervious to its influences. Inasmuch as it is traversed by the Banka, originally a spill channel of the Damodar, which brings down vast quantities of silt from the Chota-Nagpur plateau, the action of this river has apparently not been inconsiderable in bringing about a gradual transfusion of the soil peculiarly favourable to the growth of scrub and bush jungle.

50, KAILAS BOSE STREET,

S. C. LAW, M.A., Ph.D.,

CALCUTTA.

F.Z.S., M.B.O.U.

October 22, 1935.

XV.—FURTHER REPORT ON THE NESTING OF
GEOCICHLA C. CITRINA LATH. IN 24-PARGANAS
(BENGAL).

I had on two previous occasions (*J.B.N.H.S.*, xxxvi, 501-2; *Ibis*, twelfth series, i, 778) recorded my observations on the nesting of *Geocichla c. citrina* Lath. in the district of 24-Parganas. I have now to report further instances which came to my notice:

July 2, 1935. Two young secured near Dum Dum from a nest in a mango tree.

July 10, 1935. A clutch of four fledgelings, also another clutch of two young: locally procured by a bird-catcher and brought for sale to the bird fair on the occasion of the Car Festival.

July 14, 1935. Nest with two young found in a bamboo clump in a place called Kerati near Dum Dum Aerodrome. One young ♀ still thriving in my aviary.

August 28, 1935. A nest found near Dum Dum Aerodrome with two young just hatched out.

It appears that protracted drought and exceptional weather conditions due to belated monsoon prolonged the period of nesting.

50, KAILAS BOSE STREET,
CALCUTTA.

S. C. LAW, M.A., Ph.D.,
F.Z.S., M.B.O.U.

October 22, 1935.

XVI.—THE DISTRIBUTION OF THE KASHMIR ROLLER.
(*CORACIAS GARRULA SEMENOWI* LOUDON & TSCHUSI).

In October 1935, Br. A. Navarro, s.j., of the St. Xavier's College Museum, obtained two specimens of the Kashmir Roller (*Coracias garrula semenowi*) at Khandalla. As the *New Fauna* limits this bird to an area in North and North-Western India, the following records of its occurrence in Peninsular India may be of interest.

Davidson (*J.B.N.H.S.*, xii, 43) records a single specimen from Majoli, 5 miles north of Karwar, in November 1893. In the Bombay Natural History Society collection there are two skins obtained by T. R. Bell at Karwar in October 1898.

At a meeting of the Society held on 24th April 1900, E. H. Aitken mentioned the *European Roller* as one of the birds 'not usually found in or near Bombay, which had appeared that year, owing no doubt to the want of water and food in Guzerat and the Deccan' (*J.B.N.H.S.*, xiii, 398).

These records seem to show that the Kashmir Roller is a more or less regular visitor to the south along the line of the Western Ghats. In the field this bird may be distinguished from the Indian Roller or Blue-jay (*C. benghalensis*) by the absence of the large brown patch on the upper breast.

GODREJ HOUSE,
ANDHERI.

November 29, 1935.

H. ABDUL ALI.

XVII.—HABITS OF THE PLAINTIVE CUCKOO
(*CACOMANTIS MERULINUS* SCOP.).

I have recently had the opportunity of observing the bird described by Jerdon as the Indian Plaintive Cuckoo, at a place just below Kasauli, height about 5,000 ft. above sea-level. I saw a single bird several times, with the usual grey plumage. It was not at all shy, and I was able to see it at close quarters with field-glasses and to hear the typical call.

Yesterday evening I saw the bird with what I took to be its mate. This was bright rufous, with the abdomen barred, exactly as described by Jerdon as the adult in rufous plumage. What interested me was the fact that for the most part the rufous bird remained perched on the branch of a tree, whilst the grey one foraged for caterpillars, which it then brought and presented to the other, which ate them with relish.

Can you tell me whether it is a common event for a bird to feed its mate in this way? The rufous bird can scarcely have been one of the progeny of the gray one, for surely a cuckoo does not feed its own young.

Since writing the above I have come across an article by E. C. Stuart Baker in your *Journal*, vol. xvii, p. 83, in which he quotes Capt. Hutton's remarks regarding the Himalayan Cuckoo, *C. optatus* (Oates' *Nests and Eggs*, ii, p. 381):—'I have seen the young cuckoo sitting for hours together on a branch waiting for the return of the adult which continued every now and then to bring supplies of caterpillars wherewith to satisfy the apparently insatiable appetite of the nestling until at last both would fly off to another spot.' This exactly describes what I saw, but I think there is no doubt that the bird I saw was the Indian Plaintive Cuckoo.

PASTEUR INSTITUTE OF INDIA,

KASAULI, PUNJAB.

July 11, 1935.

G. COVELL,

Lt.-Col., I.M.S.

XVIII.—THE SHORT-EARED OWL [*ASIO FLAMMEUS*
(PONTOPP.)] OUT AT SEA.

On the 19th October this year while on board the s.s. *Vita*, on my return journey from Cutch I noticed a bird, soon followed by two others, approaching the ship from the west. The ship was then about four hours' journey from Bombay Harbour. The flight of the birds was owl-like; but it was not until they came near that I was able to be sure. Finally one of them settled on the rigging quite close to me and it proved to be the Short-eared Owl (*A. flammeus*). The birds followed the ship for about an hour, at

times flying high above the ship, at others just skimming the water's surface, in the same manner as do gulls. After this they went east towards the land which was just visible.

These birds were evidently on migration, as it is well known that the Short-eared Owl visits India during the winter months.

BOMBAY NATURAL HISTORY SOCIETY,

BOMBAY.

C. McCANN.

October 23, 1935.

XIX.—VULTURES FEEDING AT NIGHT.

I noticed on p. 190 of vol. xxxviii of the *Journal* a note by Mr. R. C. Morris on vultures feeding at night.

In case it is of any interest, I had an identical experience in 1921 when sitting up over a kill for a tiger near Neemuch. In my case, however, the vultures were disturbed before they could entirely demolish the kill.

MACHINE GUN SCHOOL,

AHMEDNAGAR.

W. GOUGH.

September 18, 1935.

XX.—PROBABLE BREEDING OF THE BLACK-WINGED STILT (*HIMANTOPUS H. HIMANTOPUS* LINN.) IN THE SHWEBO DISTRICT, UPPER BURMA.

In vol. xxxv, No. 1, of the *Journal* (June 15, 1931), I mentioned having found a small colony of Stilts obviously breeding two miles east of Kinu in the Shwebo district in July 1931 on a bog of volcanic origin, which is locally called a 'soap-bog'.

I had no opportunity to revisit this place until August 4th, 1935, when I flushed a single bird out of the rushy grass on the edge of the bog which was very loath to leave the place and almost certainly had young ones in the grass. The main part of this bog, about ten acres, is quite impassable, and the only other birds frequenting it were *Charadrius dubius jerdoni* and some Temminck's Stilts.

The only other breeding records of this bird from Burma are from Myingyan in June and July 1900-1901 (*J.B.N.H.S.*, xvii, p. 499).

MYITKYINA,

UPPER BURMA.

August 6, 1935.

J. K. STANFORD,

Indian Civil Service.

XXI.—THE JACK SNIPE AND THE WHITE-EYED
POCHARD IN HYDERABAD.

The Hyderabad State Ornithological Survey did not come across the Jack Snipe (*Lymnocyptes minima*) and the White-eyed Pochard (*Nyroca rufa*). Major R. H. Stable, 3/6th Rajputana Rifles, whose game register for the seasons 1928-1930 is filed at the Society's office, shot jack snipe at Secunderabad as follows:

Season 1928-1929. 7 jack between 16th October and 22nd February, out of a total of 181 snipe.

Season 1929-1930. 33 jack between 9th October and 15th February, out of a total of 408 snipe.

In Stuart Baker's *Ducks*, Mr. P. M. Allen is recorded to have shot a pair of White-eyes in the Nizam's territory at Nalgonda, latitude 17°22'.

GODREJ HOUSE,
ANDHERI.

H. ABDUL ALI.

November 29, 1935.

XXII.—SOME RARE BIRDS IN NORTHERN BURMA.

The records which follow are from the Myitkyina district.

These skins have been sent to Dr. C. B. Ticehurst, whose notes are in square brackets.

Suthora unicolor. Brown Suthora.

There do not appear to be any Indian records of this Crow-Tit since the first edition of the *Fauna* was published. There are certainly none from Burma.

Mr. W. Stubbs shot a female on December 29th, 1934, on the Pajao-Nahpaw road, which winds round the western edge of Lungrebum (8,528 ft., Sheet 92, Survey of India). Lungrebum is at the extreme east-south-eastern corner of the Myitkyina district, and forms here the Myitkyina-Yunnan border. A few miles to the south-west, the Myitkyina and Bhamo districts meet at Nabang. I examined this bird a few minutes after it was shot and it was apparently with a flock of seven or eight others feeding in stunted cane jungle (which is a feature of this area), on a treeless hillside at about 7,000 ft. It had a most distinct white ring round the eye, a character not noted in the *Fauna*, and I recorded the soft parts at the time as: *iris* pale yellowish white, *bill* pale horny yellow, *legs* and *claws* plumbeous-green. I shot specimens of *Pseudominia castaneiceps* and *Fulvetta manipurensis* in this locality, on the same day but had no other opportunity to visit these hills.

[This specimen, as might be expected, belongs to the Yunnan-Szechuan form *canaster* described from Washan, Szechuan, by Thayer and Bangs and of which *saturation* of Rothschild from the Shweli-Salween Divide is said to be a synonym. Mr. Stanford's bird matches Yunnan examples in the British Museum. *Suthora unicolor canaster* is a new form to the avifauna of British India.]

Pomatorhinus ferruginosus. Coral-billed Scimitar Babbler.

The *Fauna* (Edition II) does not record any race of this Babbler as occurring between the Chin Hills and Yamethin, in Central Burma. In December 1933, I had a close view of a Scimitar Babbler with a vermilion or coral-red beak and a white supercilium at about 3,000 ft. in bamboo jungle near Sumprabum. In May 1934 Mr. W. Stubbs obtained a female at Kambaiti on the Yunnan border (7,000 ft.). In December 1934 I saw two or three, and shot a male on the Sadon-Sima frontier road at between 5,000 ft. and 7,000 ft. These were all with flocks of *Actinodura egertoni* in bamboo and tree jungle and, unlike the latter, were extremely shy, giving only momentary glimpses of themselves and uttering a repeated 'churring' note. When seen, the supercilium and bill were most distinctive characters in the field.

[This Scimitar Babbler belonged to no known form of *ferruginosus* and therefore I described it as new under the name *Pomatorhinus ferruginosus stanfordi* (Bull. B.O.C., lv, p. 178, June 1935).

At the same time I feel doubtful if *P. f. mariae* from the Karen Hills is different to *P. f. albigularis* from North Tenasserim but only fresh material from these two localities can decide the question.]

MYITKYINA.

June 1935.

J. K. STANFORD,

Indian Civil Service.

XXIII.—NOTES ON ELWES' HORNED PHEASANT
(*CROSSOPTILON HARMANI* ELWES).

Location.—Near Nyengo, Tibet, about half way up the Gokar La Pass. Altitude 14,000 ft. Latitude 29°25'N. Longitude 91°33'E. Date 21st August 1935.

Type of country.—Steep-sided mountain, thickly covered with several types of dense prickly bushes, stunted silver birch trees, herbs and grass from which large rocks protruded in abundance. Country very difficult to move over.

Habits noticed.—A covey of 7 adult and young birds was first seen sitting on a rock. They were conspicuous by their red legs and feet. When this covey was flushed a number of other *Crossoptilon* started 'clucking' and showed this particular part of the mountain side to be swarming with them. It was not difficult to approach them to within 40 yards. When flushed they flew down hill. Amongst those seen were a number of young birds somewhat resembling black partridge both in colour and size.

The adults appear to have two distinct cries—one a 'Cluck' of alarm with a rather metallic resonance, and the other a communication call resembling the 'come-back' of the domestic guinea fowl. The young birds' call is a kind of shrill whistling cry very similar to that of the Marmot.

POLITICAL DEPARTMENT,
LHASA.

September 12, 1935.

R. K. M. BATTYE,
Captain.

XXIV.—MIGRATION OF WILDFOWL.

(Continued from volume xxxvii, page 738).

Since the publication of the last recoveries of ringed birds, the following recoveries have been reported to us:—

| Place of Ringing | No. | Date | Species | Ringed by | Date of recovery | Locality | Remarks. |
|--|------|----------|---|--------------------------------|------------------|---|----------|
| Indore State. | 720 | 12- 2-29 | Coot (<i>Fulica atra</i>) | Conservator of Forests, Indore | March 1929 | Near Station Veliko-Alexeevskaya, Trans-Siberian Railway, Province Tashkent. | |
| Kashgar, Chinese Turkestan. | 2973 | 27- 1-29 | Mallard (<i>Anas platyrhynchos</i>) | Capt. G. Sherriff | 1-5-35 | Village Lukovka, Pankrushicha, Region Kamensky, W.Siberia. | |
| Khadi Lake, Sujawal Taluka, Karachi Dist. | 3053 | 18- 1-30 | Pochard (<i>Nyroca rufa</i> 2) | Meher Aly Shah | April 1233 | Village Solo-Tumba Kazak, Autonomous Republic 44° 34' N., 56° 7' E. | |
| Manchar Lake, ca. 26° N × 68E. She-wan Taluka, Sind. | 1271 | 21- 3-30 | Shoveller (<i>Spatulaclypeata</i>) | K. G. Advani | 25-5-30 | Bolshié Tochty, Barabinsk Dist., Siberia. | |
| Purnia Tank, Bihar State. | 82 | 14- 2-29 | Common Teal (<i>Nettion craca</i> juv.) | Ahmed Nur | 31-3-35 | Village Novo Pokrovskoe, region Kantovskii, 14 km. off the town of Frunse (formerly Peshpek) about 42° 26' N., 74° 15' E. | |
| Jhalja, Bahawalpur State, ca. 29° N. × 72E. | 2128 | 11-12-28 | Dun Bird (<i>Nyroca ferina</i>) ♂ | G. Atkinson | 15-5-30 | Bolshié, Tochty, Dist., Barabinsk, Siberia. | |

Since the commencement of the Society's Bird Banding Scheme approximately 4,000 rings have been issued to members and others interested in the migration of wildfowl. So far 26 birds have been recovered of which 13 were recovered in India either in the same year as they were ringed or on return from their breeding rounds. The remaining 13 were reported to have been captured or shot outside Indian limits, chiefly in Siberia.

Owing to the absence of properly organised Bird Banding Stations in India the ringing of wildfowl has been confined to ducks in places where they are regularly snared or shot.

BOMBAY NATURAL HISTORY SOCIETY,

BOMBAY.

January 1936.

EDITORS.

XXV.—DO BIRDS EMPLOY ANTS TO RID THEMSELVES OF ECTOPARASITES?

In the course of our collaboration in the account of the birds of Bombay and Salsette (to be published in this *Journal*) my cousin Humayun Abdulali recently sent me the following note on Jerdon's *Chloropsis* [*Chloropsis jerdoni* (Blyth)].

'On 8 September 1934 I observed a pair catch and eat Red Ants (*Oecophylla smaragdina*) on a mango branch. The ants were captured in the beak and then quickly but deliberately rubbed into the tail feathers before being swallowed. Every ant captured was scrupulously treated in this peculiar fashion.'

He speculates that the ant is crushed and the sac-like abdomen bursts in the process discharging formic acid 'which may be absorbed by the fluffy tail-coverts' (?)

As far as I am aware, a similar observation has not been made in India before and Abdulali deserves credit for recording what most people would have considered far too trivial or 'original' to bother about. The instance only shows—if an example were needed—how much there is still to be learnt by an unprejudiced study of the *live* bird.

Referring to literature, it is interesting to find that the same question as heads this note was put forward by Dr. E. Stresemann in the *Ornithologische Monatsberichte* for July-August 1935 (p. 114). He pointed out that the expected discussion had not been produced by the publication of H. Heine's note in *Orn. Monatsb.* in 1929 (p. 188) under the title 'Crows use Ants to get rid of Ectoparasites', but that he had now, for the first time, found quite similar observations recorded in the recent book by A. H. Chisholm, *Bird Wonders of Australia* (Sydney, 1935), pp. 153-5.

In the note referred to, Heine had observed some Hooded Crows (*Corvus cornix*) deliberately seeking an ant-hill of *Formica rufa* and squirting or allowing themselves to be squirted with formic acid in order, the author presumed, to rid themselves of ectoparasites. Mr. Chisholm in his book, describes European Starlings (*Sturnus vulgaris*) introduced into Australia, taking ants in their bills and sticking them deliberately under their wings, and also suggests that the object of this behaviour was to expel or kill

the ectoparasites by means of the formic acid exuded by the squashed insects.

A number of very interesting notes on similar observations from readers of *Ornithologische Monatsberichte* followed the above communication by Dr. Stresemann, and these are published in the September-October issue of that *Journal* (pp. 134-8). Aggregately they indicate that without doubt this habit is widely and regularly practised by many species of birds, especially of the tropics.

Kleinschmidt refers to a short communication published in a sporting paper as far back as 1911, of a tame Magpie (*Pica pica*) eagerly seeking all available cigar stumps and rubbing them into its plumage. *Apropos* of this note, Dr. Heinroth observed at the time that Starlings do something similar with live ants and that a young Dipper (*Cinclus cinclus*) was seen by himself and his wife to catch the insects in the tip of its bill and rub them deliberately through its wing feathers. The ant was then dropped, a fresh one seized and the action was repeated on the feathers of the abdomen and thighs. It would be assumed, naturally enough, that the bird did so to get rid of vermin, but Dr. Heinroth further remarked that several young dippers taken by him from the nest and who could not have had a similar experience before, acted in precisely the same manner although no trace of any parasites could be detected on them, a fact which suggests that the reaction is wholly instinctive.

Other writers also recorded similar observations with crows and starlings, of these birds not only sticking the insects into their feathers, but literally 'bathing' in a swarm of ants. Herr Neunzig observed that caged *Leiothrix* and several species of *Garrulax* will even stick mealworms into their plumage. From this, Dr. Kleinschmidt speculates that it may perhaps be the pleasant sensation produced by insects crawling through their plumage—akin to that produced by stroking a bird's nape with the fingers, which it so obviously enjoys—that induces birds to behave in this manner.

One correspondent mentions that his tame Carrion Crow (*Corvus corone*) 'bathes' as often as it can in ant swarms with much apparent relish, one such bath lasting for 25 minutes! The bird gathers a number of ants in its bill, squashes them, rubs them through its plumage and then casts them away in the form of a pellet and gathers more. The same observations have been made with captive *Chloropsis* species and with the thrushes *Turdus musicus* and *T. philomelos*.

A. Troschütz is quoted as writing in *Gefiederte Welt* (1931, p. 484) as follows: A peculiarity which only some exotic birds (*Leiothrix lutea*, *Lioptila capistrata*, etc.) and the Thrushes have in common is their predilection for ants, not as food but for rubbing into their thighs, rump and wings. The formic acid has probably some beneficial effect, but whether it helps to eradicate parasites or acts as some form of general tonic is doubtful. In the case of his tame crow, at any rate, Herr Troschütz doubts if it can be the former, since the bird takes plenty of water baths and keeps itself scrupulously clean.

The notes published deal in all with the following species of

birds, both captive and in a wild state: Magpie (*Pica pica*), Jay (*Garrulus glandarius*), Starling (*Sturnus vulgaris*), the crows *Corvus corone* and *C. cornix*, *Leiothrix lutea*, *Lioptila capistrata*, *Garrulax* spp., *Chloropsis* spp., the thrushes *Turdus musicus* and *T. philomelos* and the Dipper (*Cinclus cinclus*).

Besides ants, which are regularly and deliberately rubbed through the plumage by all of them, there are other things which have also been observed to be similarly utilised. Cigar ends and mealworms have been mentioned before, and 'Flohkrebs' (?) and many acid fluids such as lemon-juice and vinegar are among the others.

Formic acid—first discovered by Rey in 1670 by distilling red ants (*Formica rufa*)—is well known to be a powerful antiseptic, and ants rubbed into the feathers of a bird would indeed effectively rid them of noxious insects as has been generally suggested. Mealworms and 'Flohkrebs' (evidently some sort of caterpillars?) require closer investigation, although it is known that formic acid is also formed in the acid secretions of certain caterpillars.

Tobacco-juice or decoction is commonly sprayed by gardeners to ward off insect pests and is also widely and effectively used by jungle people to deter leeches from climbing up their legs and for dropping off partly satiated ones. Moreover, it is common knowledge that a slice of lemon rubbed on to the arms, neck etc. will discourage bites of mosquitoes and sandflies (*Culicidae* and *Psychodidae*) and it seems very probable that lemon-juice (*citric acid*) may have a similarly repellent action on lice (*Mallophaga*), ticks and other ectoparasites of birds. It is not difficult to conceive, therefore, that in the above cases, the cigar-ends, lemon-juice, vinegar etc. may all have been instinctively employed by the birds for this purpose although the immediate need was not apparent.

As Dr. Stresemann points out in his summing up, however, the assumption that the ridding of parasites is the real object of this behaviour is merely a conjecture so far, albeit a very plausible one. It is hoped that this note will provoke further observation and experiment.

Curiously enough in none of the observations referred to is there a suggestion that the ants were eaten by the birds at the time or after being rubbed through the feathers, and in this Humayun Abdulali's note differs from the rest. Ants in varying degree form the food of so many bird species in India that there is nothing remarkable about this part of his observation, but the effect of formic acid taken internally is of some interest. Taken by mouth or hypodermically, it is said to give tone to the muscles, increase muscular energy and abolish the sense of fatigue.¹ The Stinging Nettle (*Urtica dioica*) which also contains formic acid, has long been employed as a tonic and diuretic, and it may be for this and the other beneficial properties that red ants are eaten by the Santāls, a typical Dravidian tribe of Chōta Nāgpūr.²

¹ Martindale and Westcott, *The Extra Pharmacopoeia*, 19th edition, 1928, vol. i, p. 34.

² Sir George Watts, *Dictionary of Economic Products of India*, vol. i, p. 264.

In addition to formic acid, ants also contain a small amount of formaldehyde and at a certain stage these may be chemically acted upon by the gastric secretions of the bird and converted into glucose which is a very valuable food material. It is conceivable also that at times the formic acid from the squashed and swallowed ant may have the effect of ejecting endoparasites with which we know birds are commonly afflicted.

Dr. Stresemann suggests the use of a special term for this 'rubbing in' process on a par with preening which may be translated into English, and henceforth used, as 'anting',—e.g. a bird ants itself or its feathers, even when objects other than ants (necotine, lemon-juice, mealworms etc.) are used in the process.

DEHRA DUN.

SALIM ALI.

November 11, 1935.

XXVI.—GECKOS AND SUPERSTITION.

Many reptiles have given rise to superstitious notions the world over, and lizards have also made their contribution in this direction. Having been engaged in the preparation of a detailed memoir on the common Indian wall-lizard (*Hemidactylus flaviviridis* Rüppel) for the last two years, I have been much interested in the prevalent superstitions about geckos. Some of the results of my search are given below.

Flower¹ says, "Bors", or "Abu Bors", is, as it was in the time of Forskaal, the common name for any Gecko in Egypt. Better-informed people may tell you that it is "Abu Boris", to fit better with the words used by Damiri, "Abou Baris" (Jayakar's translation, 1, p. 352) and "Sám Abras" (o.c. 2, p. 23), meaning respectively "Father of leprosy" and "Poison of a leper." Damiri wrote: "One of the characteristic qualities of this animal is that, when it settles down in salt, it rolls about in it, giving rise to what becomes the means of producing white leprosy."

It should be mentioned that some of the desert Arabs, who know more about lizards than the Fellaheen do, include under the term "Bors" the Red-spotted Lizard *Eremias rubropunctata*: I do not know why. They believe in poisonous and non-poisonous lizards: a non-poisonous lizard may be known by its running fast for a short distance and then stopping suddenly—for it has remembered it has no poison!

The bite of house-geckos is generally, though erroneously, regarded as poisonous and Roberts² describes ten native remedies for it. Even the saliva³ of these creatures is believed by some people to be highly emetic. According to an article in *Encyclo-*

¹ Flower, S. S., 'Notes on the Recent Reptiles and Amphibians of Egypt, with a list of the Species recorded from that Kingdom.' (*Proc. Zool. Soc.*, 1933, pp. 742-3.)

² Roberts, E., 'Native Remedies used in Snake-Bites, etc.' (H. W. Cave & Co., Colombo, 1919, pp. 41-3.)

³ Prof. N. M. Antani, St. John's College, Agra, tells me that the dropping of a house-lizard's saliva in milk is believed by the people of Gujarat to make the latter highly poisonous.

paedia Britannica,¹ the saliva is supposed 'to produce painful cutaneous eruptions'; and even the touch of geckos 'was thought sufficient to convey a dangerous taint'. In almost all places in India, the touch of a house-lizard is believed to be polluting in effect and there are people who attribute this reptile to the pariah or 'sweeper' caste.

The following explanation² of this popular disfavour sounds plausible: 'With the head considerably flattened, the body short and thick, the legs not high enough to prevent the body from dragging somewhat on the ground, the eyes large and almost destitute of eyelids, and the tail short and in some cases nearly as thick as the body, the geckos altogether lack the litheness and grace characteristic of most lizards. Their colours also are dull, and to the weird and forbidding aspect thus produced the general prejudice against these creatures in the countries where they occur, which has led to their being classed with toads³ and snakes, is no doubt to be attributed.'

In India, both the sound produced by a house-gecko and its falling on the human body are supposed to be predictive in nature. Several Indian almanacks give accounts of the consequences to be expected if a lizard produces sound from this or that direction, or happens to fall on a particular part of the body. The following quotation⁴ is an example:

'If the house-gecko (*Tiktiki*) makes a sound from above, acquisition of money is expected; from the east, immense success; from the south-east, fear; from the south, fear of fire; from the south-west, quarrel; from the west, profit; from the north-west, fine clothes and scented water; from the north, gain of goddess-limbed woman; and from the north-east, death. The same consequences can be expected from sneezing.

'If the house-lizard falls on the right side of the body, there will be loss of relatives and money. On the left side, profit. On chest, forehead, back and throat, gain of kingdom. On arms, legs and heart, happiness.'

Tamil almanacks,⁵ however, are far more detailed in this respect. In them, the consequences to be expected from a

¹ 'Gecko' (*Encycl. Brit.*, 11th. ed., 1911, xi, pp. 546-7).

² *Op. cit.*, same pages.

³ Cf. Shakespeare's *Macbeth*, IV, i, ll. 12-19:

'Fillet of a fenny snake,
In the caldron boil and bake;
Eye of newt and toe of frog,
Wool of bat and tongue of dog,
Adder's fork and blind-worm's sting,
Lizard's leg and howlet's wing,
For a charm of powerful trouble,
Like a bell-broth boil and bubble.'

⁴ From *Gupta Press Directory Panjika* (Bengali), 1935-36, p. 41 (published by Gupta Press, Calcutta). The passage was translated by Mr. J. C. Banerjee, to whom I am thankful for it.

⁵ I have consulted *Anand Bodhini*, 1933, edited by C. G. Rajan, B.A. Mr. C. S. Krishnamurti who kindly translated the necessary passages for me, tells me that exactly the same sort of thing is mentioned in other Tamil almanacks also and that there is no change in this portion from year to year.

gecko's sound depend not only on the direction from which the sound is produced, but also vary from day to day in the week. The parts of the body on which the lizard may fall are mentioned in great detail, and the consequences also appear to be better discriminated. The list consists of as many as forty-five anatomical regions.

Why is the gecko's sound regarded as prophetic? Here is an interesting explanation:¹

'The God Boar cut off the tongue of Khona Saheb and stood guarding it in a secret place. The lizard came, thought that it was an article of food and devoured it. Since then, the sound of a house-lizard can bring the facts of past and future to light.' Obviously, Khona Saheb was a great prophet himself!

One should like to know, however, why the fall of the house-lizard on the human body comes to have predictive value. Perhaps some member of the Bombay Natural History Society can enlighten us on this point!

ST. JOHN'S COLLEGE,
AGRA.

B. C. MAHENDRA.

August 20, 1935.

XXVII.—THE NOTODONTID MOTH *DUDUSA NOBILIS*
WALKER.

In vol. xxxviii, No. 1, Mr. T. R. Bell gives an interesting account of the early stages of the above moth.

It might interest Mr. Bell and other members of the Society to know that I have a pair of these moths in my collection and which were caught in the house which to my mind proves they 'are attracted by artificial light'. I mention this as Mr. Bell says they are certainly not.

This moth is fairly common in Upper Burma as I have seen many on the wing but only cared to collect a pair. If I have an opportunity to collect others I shall be glad to send Mr. Bell a specimen or two for comparison with his own bred ones.

Unfortunately I did not at the time record the date of capture.

MAYMYO,
BURMA.

W. C. CARROTT,
Captain.

September 4, 1935.

XXVIII.—OCCURRENCE OF *UNKANA ATTINA* IN THE
TEESTA VALLEY.

When collecting in the Teesta Valley below Kalimpong (Darjeeling District), I captured a ♂ *Unkana attina* on 8th September 1934, flying at about 1,000 ft. in shady jungle. I identified it by Brigadier-General Evans' *Identification of Indian Butterflies*, and was surprised to see that it had hitherto apparently not been taken further north than Bassein.

¹ Gupta Press Directory Panjika, 1935-36, p. 76.

Recently I had the good fortune to be able to show it to Brigadier-General Evans in the South Kensington Museum, who confirmed my identification, and added that my specimen was distinctly darker than any of the series in the Museum, which show a progressive darkening towards the north. This seems to indicate that this butterfly may be found sparingly throughout the intermediate region and have an alternative to its normal food-plant, the cocoa-nut palm, which is not found in the Kalimpong district.

On the other hand as the district has been so extensively worked by collectors, and the butterfly itself is so large and distinctive, consideration must be given to the possibility that it may have been accidentally imported in the pupal stage in a crate of cocoa-nuts.

SOUTH KENSINGTON,
LONDON, S.W.
July 20, 1935.

JOHN ELIOT,
Lieutenant, R.A.

XXIX.—ON THE PRESERVATION OF *HETEROCCERA* IN INDIA.

Collectors of Butterflies are far more numerous in India than those of Moths, the reasons usually advanced being that the *Heterocera* are more difficult to identify and preserve.

The first of these reasons has a certain foundation, the only general books that are easily obtainable being Hampson's Moths in the *Fauna of British India* and the three Indo-Australian volumes in Seitz's *Macrolepidoptera of the World*. Hampson is now out of date and incomplete and Seitz, which is still in course of publication, does not include the *Pyralidae*.

The excuse regarding preservation, however, is completely unfounded and the following account of how I deal with my specimens may be of help to other collectors. In the first place I must make it clear that I set nothing in India, all my specimens being papered and sent to Europe.

After killing the moth with cyanide, I paper it in exactly the same way as I would a butterfly, the envelope bearing the usual data in pencil. I keep the papered specimens in a large cigarette drying bottle, the drying pad being exchanged for a wad of cotton soaked in creosote as a preventive against mildew. I never eviscerate even the largest species and, except for an occasional specimen becoming greasy, I have never had the slightest trouble. As soon as I have accumulated a couple of hundred insects, I pack them securely and post them to London, where they may remain for two or three years before being relaxed and set.

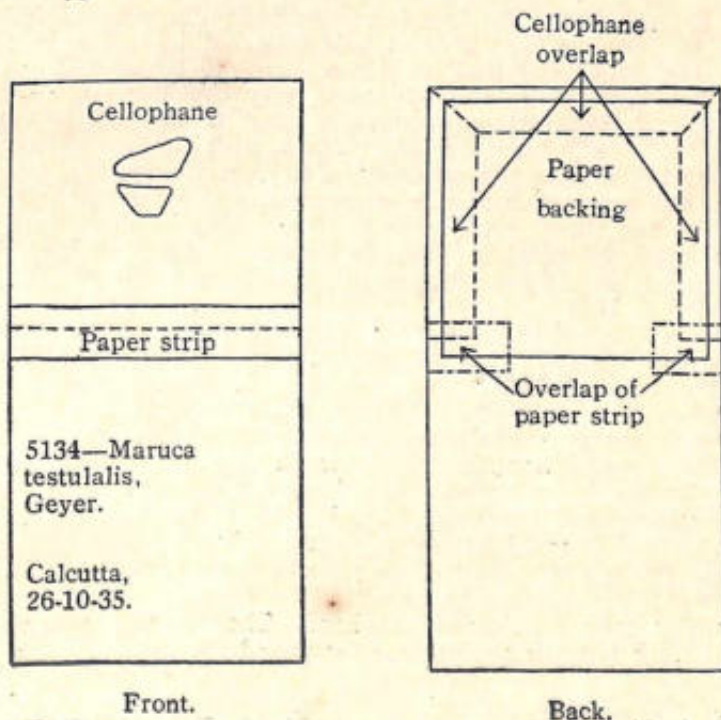
For relaxing I use methylated spirit. The papers and their contents are damped with the spirit and are then shut up in an air-tight tin for a couple of days. The insects will then be perfectly pliable and ready for setting and can be removed from the setting boards after twenty-four hours. Hairy-bodied species should not be damped, as this leads to the matting of the hair on the thorax and abdomen, but should be exposed to the fumes of a mixture of spirit and water. It is important to write all data

on the envelopes in ordinary lead pencil; ink or copying pencil is affected by the spirit and will cause stains on the insects inside the papers. I have employed this method with great success on the largest *Saturniidae* and the smallest *Pyralidae*.

For reference in India, I keep a series of wings mounted on cards. These are prepared as follows:

Take a suitable piece of card, I use small visiting cards, and cut a piece of Cellophane large enough to cover from a third to a half of the card, depending on the size of the wings to be mounted, and to overlap each side and the end. The two wings of one side are then cut off as close to the base as possible, a thin film of good paste such as Gripfix is brushed over the card, the wings are placed in position and the whole covered with the Cellophane and pressed down. The overlaps are turned over and pasted to the back of the card, a thin strip of paper is pasted over the free edge of the Cellophane to prevent it coming away from the card and a small square of paper is pasted over the back of the mount to prevent it warping with changes in humidity. The usual data is written on the exposed half of the card. I have found it convenient for comparison to make all mounts with wings from the same side, either right or left is immaterial. If the markings of the underside are of importance, a wing can be mounted to show this aspect also.

The appearance of the finished mount is shown below.



Papered specimens are very difficult to examine and I have

found these mounts extremely useful in two ways. They enable local variation to be recognised at once and also serve as a basis when identifying one of a group of allied species, especially those where Hampson's description reads 'As . . . but lines more oblique.'

CALCUTTA.

D. G. SEVASTOPULO, F.R.E.S.

October 28, 1935.

XXX.—ON THE FLOWERING OF *STROBILANTHES* IN 1934.

Very little has been known about the periodical flowering of the numerous species of the genus *Strobilanthes* and M. E. Robinson's record of the flowering of a few of them in 1934 in No. 1, vol. xxxviii of the *Journal*, is a useful contribution. As I travelled through Coorg, Wynaad and Nilgiris in September 1934 I am able to add the following species which were found flowering in addition to those mentioned by M. E. Robinson.

S. heyneanus Nees, was found in flower in jungles in Coorg and Wynaad. Gamble says it is often found in flower.

S. cuspidatus T. And. was found on the sides of hills in Gudalur. Gamble says that it was collected in flower in 1851, 1870, 1877, 1884 and that its period seems to be about 7 years.

S. sessilis Nees, was flowering very copiously all over the hills behind Naduvattam overlooking the Ouchterloney Valley. This hill is locally known as the Gudalur malai as it overlooks the town of Gudalur on the other side. It is a very pretty plant in flower and grows and flowers gregariously. Gamble says it probably flowers almost every year or at any rate at short intervals. I also found this plant in flower in the same locality in May 1933, but am not able to say whether it flowered profusely in that year as it did in 1934.

Before concluding this note I might mention that I found *S. consanguineus* C. B. Clarke, in bloom on the sacred hills of Tirupati in March 1927. This is a new locality for this plant as it has been so far known only from the Western Ghats.

Little is known about the flowering of *S. warrensis* Dalz. It has been reported from South Canara and Coorg. I collected this species on the lower slopes of the High Range, Travancore, above Neriamangalam in December 1933 but then the flowering season was over and I could gather only dry spikes.

Lovers of plants who happen to collect any species of *Strobilanthes* in flower may send them to the writer who will be glad to identify their specimens for them. The planting community can do much towards establishing the periodicity of their flowering.

BOTANY DEPARTMENT,

P. V. MAYURANATHAN.

GOVERNMENT MUSEUM, MADRAS.

PROCEEDINGS OF THE ANNUAL MEETING OF THE
BOMBAY NATURAL HISTORY SOCIETY.

The Annual General Meeting of the Society was held at the Prince of Wales' Museum on Monday the 9th March 1936 at 6-15 p.m. The Hon'ble Mr. Justice K. W. Barlee, I.C.S., was in the chair.

AGENDA.

1. Reading of the Annual Report of the Committee.
2. Presentation of the Balance Sheet and Statement of Accounts for the past year.
3. Election of the Committee.

Mr. P. M. D. Sanderson, Honorary Secretary, announced the election of the following thirty new members since the last meeting:

Mr. A. N. Moos, Bombay; Lt.-Col. J. D. Deane-Drummond, Nilgiris; Mr. B. E. Smythies, B.P.S., Rangoon; Mr. P. G. Chapman, Burma; Major J. H. L. Hindmarsh, Delhi; Mrs. M. Parker, Bandra; Mr. F. J. Mustill, I.P.S.; The Librarian, Imperial Secretariat Library, New Delhi; Mr. E. Jennings, Upper Burma; Mr. G. P. Walden, Upper Burma; Mr. L. J. Vernall, Upper Burma; The Honorary Secretary, Rangoon Literary Society, Rangoon; Major D. A. Tapp, Belgaum; Mr. J. E. Gardiner, Bombay; Capt. J. M. Ferguson, Deccan; Mr. K. D. Kothawala, Ahmedabad; Mr. E. J. H. Jacobson, Calcutta; Mr. F. C. Badhwar, Calcutta; Mr. Noel Exshaw, France; Mr. E. J. Langleston, Bombay; Mr. H. E. Burgess, Nilgiris; Mr. Mg Tun Yin, B.A., Rangoon; The Economic Botanist, Bengal; Mr. M. R. Gokaru, Kalyan; Mr. D. Willis Fleming, Assam; Miss Winifred H. Baker, Lahore; Rev. M. G. Champion, Roorkee; Capt. G. McElligot, M.R.C.V.S., Bombay; Mr. U. B. H. Dunbar, Burma; and Mr. Jal N. D. Tata, Bombay.

The following proposals were accepted:—

Vice-President.—Rev. Fr. J. F. Caius, S.J., in place of the late Rev. Fr. E. Blatter, S.J.

Executive Committee.—Mr. H. D. Ash, in place of Major S. L. Bhatia, I.M.S., who does not attend meetings.

Advisory Committee.—Two names to be struck off the roll, i.e. Lt.-Col. F. C. Fraser, I.M.S., and Lt.-Col. C. H. Stockley, D.S.O., who have left India.

BOMBAY NATURAL HISTORY SOCIETY.

OFFICE BEARERS—1936.

Patron.—His Excellency The Viceroy of India.

Vice-Patrons.—H. H. The Maharao of Kutch, G.C.S.I., G.C.I.E.; H. H. The Maharaja of Jodhpur, K.C.S.I., K.C.V.O.; H. H. The Maharaja of Rewa, K.C.S.I.; H. H. The Maharaja of Bhavnagar; H. H. The Maharaja of Travancore; Mr. F. V. Evans, Liverpool; Sir David Ezra, Kt., F.Z.S., Calcutta; Mr. A. S. Vernay, New York and London; Lt.-Col. K. G. Gharpurey, I.M.S. (Retd.).

President.—H. E. The Right Hon'ble Lord Brabourne, G.C.I.E., M.C.

Vice-Presidents.—H. H. The Maharao of Kutch, G.C.S.I., G.C.I.E.; The Hon'ble Sir Robert Bell, K.C.S.I., C.I.E., I.C.S.; Rev. Fr. J. F. Caius, S.J.

Executive Committee.—Right Revd. R. D. Acland, Bishop of Bombay, Mr. H. D. Ash, Mr. Farrokh E. Bharucha, Mr. C. B. B. Cleo, I.C.S., Sir Alwyn Ezra, Kt., F.R.G.S., F.Z.S., Mr. J. B. Greaves, M.L.C., Lt.-Col. S. S. Sokhey, I.M.S., Mr. A. Forrington (*Honorary Treasurer*), Mr. H. McGusty, Mr. P. M. D. Sanderson, F.Z.S. (*Honorary Secretary*), Bombay.

Advisory Committee.—Dr. C. F. C. Beeson, D.Sc., M.A., I.P.S., Dehra Dun; Mr. T. R. Bell, C.I.E., I.P.S. (Retd.), Europe; Lt.-Col. R. W. Burton, I.A. (Retd.), Coonoor; Mr. C. H. Donald, F.Z.S., Dharmasala; Dr. F. H. Gravely, D.Sc., Madras; Mr. S. F. Hopwood, I.P.S., Rangoon; Mr. C. M. Inglis, M.B.O.U., F.Z.S., Darjeeling; Mr. R. C. Morris, F.R.G.S., F.Z.S., Coimbatore;

Major E. G. Phythian Adams, F.Z.S., I.A. (Retd.), Nilgiris; Dr. Bains Prashad, D.Sc., Calcutta; Mr. H. C. Smith, I.P.S., Maymyo; Mr. J. H. Williams, Coimbatore.

ANNUAL REPORT OF THE BOMBAY NATURAL HISTORY SOCIETY.
FOR THE YEAR ENDING 31st DECEMBER 1935.
ADMINISTRATION.

President.—H. E. The Right Hon'ble Lord Brabourne, G.C.I.E., M.C.

Vice-Presidents.—H. H. The Maharao of Kutch, G.C.S.I., G.C.I.E.; The Hon'ble Sir Robert Bell, K.C.S.I., C.I.E., I.C.S.

Executive Committee.—Right Revd. R. D. Acland, Bishop of Bombay, Mr. Farrokh E. Bharucha, Major S. L. Bhatia, I.M.S., Rev. Fr. J. F. Caius, S.J., Mr. C. B. B. Clee, I.C.S., Mr. Alwyn Ezra, F.R.G.S., F.Z.S., Mr. J. B. Greaves, M.L.C., Mr. H. McGusty, Mr. J. G. Ridland, Lt.-Col. S. S. Sokhey, I.M.S., Mr. A. Forrington (*Honorary Treasurer*), Mr. P. M. D. Sanderson, F.Z.S. (*Honorary Secretary*), Bombay.

Advisory Committee.—Dr. C. F. C. Beeson, D.Sc., M.A., I.F.S., Dehra Dun; Mr. T. R. Bell, C.I.E., I.P.S. (Retd.), Karwar; Lt.-Col. R. W. Burton, I.A. (Retd.), Coonoor; Mr. C. H. Donald, F.Z.S., Dharmasala; Lt.-Col. F. C. Fraser, I.M.S., Coimbatore; Dr. F. H. Gravelly, D.Sc., Madras; Mr. S. F. Hopwood, I.P.S., Rangoon; Mr. C. M. Inglis, B.E., M.B.O.U., F.Z.S., Darjeeling; Mr. R. C. Morris, F.R.G.S., F.Z.S., Coimbatore; Major E. G. Phythian Adams, F.Z.S., I.A. (Retd.), Nilgiris; Dr. Bains Prashad, D.Sc., Calcutta; Mr. H. C. Smith, I.P.S., Burma; Lt.-Col. C. H. Stockley, O.B.E., D.S.O., M.C., Meerut; Mr. J. H. Williams, Coimbatore.

Staff.—S. H. Prater, M.L.C., J.P., C.M.Z.S. (*Curator*); C. McCann, F.L.S. (*Assistant Curator*).

THE HONORARY SECRETARY'S REPORT FOR THE YEAR 1935.
THE SOCIETY'S JOURNAL.

The Thirty-seventh Volume of the *Journal* was completed and two parts of Volume XXXVIII were issued during the year.

Birds:—

Survey of Eastern Ghats.—The more important scientific papers published during the year include the reports on various Ornithological Surveys. Messrs. Kinnear and Whistler continued their reports on the Vernay Scientific Survey of the Eastern Ghats, parts X, XI and XII of which were published. The authors deal with the Parrots, Bee-eaters, Kingfishers, Hornbills, Swifts, Nightjars, Owls and Vultures which occur in the Madras Presidency, and comment on their status and distribution.

Travancore and Cochin.—Parts I, II and III of the Ornithology of Travancore were published during the year. The papers are based on a Survey of the States of Travancore and Cochin, carried out by the author Mr. Salim A. Ali in 1933. Since the publication of Hume's and Ferguson's papers on the birds of Travancore a considerable advance has been made in our knowledge of the avifauna of the Peninsula of India notably through the recent surveys in the Eastern Ghats and Hyderabad State. The Survey of Cochin and Travancore was specially undertaken to link up with the surveys in neighbouring areas and so complete the data available. In his Introduction, the author makes a special plea for greater concentration on the study of birds in relation to their environment. Every student with an observant eye and an enquiring mind can make some contribution. A great many biological problems await solution by the intensive study of animal life in its environment, and such study can now be recommended to bird lovers in India. It is recommended as being of far greater importance and potentiality than the mere collection and labelling of skins.

Sittang Irrawaddy Plain.—In Volume XXXVII, No. 4, we published Mr. Stanford's note on the Birds of the Sittang Irrawaddy Plain. Since Oates published his *Birds of British Burma* in 1883, practically no one has collected in the huge area which lies between the mouth of Sittang on the East and the hills which fringe the western side of the Prome, Henzada and the Bassein

Districts. Mr. Stanford's collections in this area were identified by Dr. Ticehurst who contributed his notes to the paper which lists 291 species, 3 of which are new to Burma.

Central Provinces.—Mr. E. A. D'Abreu, Curator of the Nagpur Museum, published a paper on the Birds of the Central Provinces, based on collections and observations carried out over a period of 20 years. His paper is a revision of his list published in 1923 to which many alterations and additions have become necessary.

Chittagong.—A paper on the Birds of Chittagong was written by Capt. R. S. P. Bates based on observations made during a period of three months, March-May 1934. Capt. Bates also contributed a paper on the Nesting Habits of Some Indian Birds illustrated with the fine photographs which usually accompany his articles.

Fishes.—Fishes of Afghanistan.—In 1933 we published a paper by Dr. Sunder Lal Hora on the Fishes of Afghanistan. During the year under review we were able to publish a second paper by the same author on the fishes of this little known area. The paper is based on a collection made by Sir Richard Macdonachie, Major A. E. Farwell and Capt. E. W. Fletcher. The thanks of the Society are due to these gentlemen for their very valuable collection, the study of which has helped us to a better knowledge of the precise specific limits of McClelland's hitherto ill-defined species from this country. In Volume XXXVII, No. 4, Mr. John Berry, of the Natural History Department, University College, Dundee, described an interesting case of semi-cycloplia in a shark (*Charcharias dussumieri*). The monstrosity was obtained by the Raffles Museum, Singapore.

Snakes.—Dr. S. G. Tescherbakoff wrote a paper on the feeding of cobras in captivity based on observations of 319 specimens kept in the Serpenterium of the Haffkine Institute, Bombay. Various experiments were conducted relative to the method of feeding and housing of cobras in captivity. The results will be conducive to reducing the high rate of mortality among these snakes for whose venom there is an increasing demand from medical research workers.

Col. K. G. Gharpurey, I.M.S., contributed a paper on the Snakes of Belgium which supplemented his previous note on the snakes of this area.

Insects.—Part III of Mr. Martin Mosely's paper on Indian Caddis Flies was published during the year. The series of articles when complete will form the standard work on Indian Trichoptera. Articles on Butterflies included Major Ghosh's paper on the Butterflies of Nepal, based mainly on 3 months collecting in the Nepal Valley. The paper provides a nucleus on which a complete list of the Butterflies of this unknown region may be built up. Col. Logan Home wrote on the Butterflies of Secunderabad and its surroundings, and listed 70 species obtained within this area. The Butterflies of the Nilgiri District, a popular area among collectors, were listed in a paper by Mr. J. A. Yates. The author revises and supplements Sir George Hampson's List published in the *Journal of the Royal Asiatic Society* in 1888. Lt.-Col. F. C. Fraser described a new Drangontfly from Burma; and Mr. T. R. Bell the Notodontid Moth (*Dudusa nobilitis*) and its early stages. Mr. Mathew's interesting paper on the life history of the Plant Bug (*R. pedestris*) traces the development of the species and shows how in the early stages the nymphs exhibit close resemblances to different species of ants. The ant-mimicking is gradually lost in the subsequent moults and disappears completely in the adult. The Californian Red Scale Insect (*C. auranti*), a serious pest of citrus plants in many parts of the world, is recorded by Mr. P. M. Glover as attacking Grape Fruit grafts recently imported into India, the attack was not very heavy but of sufficient intensity to warrant control measures. In the same paper Mr. Glover records an instance of the Lac Insect as a pest of Grape Fruit. A resin spray was found effective in the control of both these coccids.

Botanical papers include 'The Revision of the Flora of the Bombay Presidency'. Parts XXVI and XXVII were published during the year. The authors, the late Rev. Fr. Blatter and C. McCann, deal in these parts with the Cyperaceae.

The Medicinal and Poisonous Plants of India are being described by Rev. Fr. Caius. During the year the author dealt with 3 Orders—the Palms, the Ferns and the Sedges and gave data of the medicinal and poisonous properties

erties of the species mentioned. Father Caius also wrote a very interesting and readable monograph on the Papaya or Papaw Tree with notes on its cultivation, food value, medicinal uses and commercial possibilities. Mr. Robinson gives an account of the flowering of *Strobilanthes* on the hills of South India in 1934. Among the species referred to is *Strobilanthes Kunthianus* 'the great blue flower' of the Nilgiris which once in 12 years colours whole tracts of the hill sides with sheets of delicate blue. The author illustrates the article with fine pen and ink drawings of 7 species.

Popular Papers.—Among the popular papers published during the year was Mr. Stuart Baker's concluding article on Waders and Semi-Sporting Birds. The series which commenced in Volume XXXI, No. 2, will form a companion volume to his work on the Game Birds of the Indian Empire, 3 volumes of which have already been published by the Society. The thanks of the Society are due to the author whose writings, for so many years, have added much to the attractiveness of the *Journal*. Mr. Stuart Baker's recently published work on the *Nidification of Indian Birds* (4 volumes, Taylor & Francis, London) will be found of great interest to all bird lovers and students in this country. It replaces Hume's *Nests and Eggs of Indian Birds* which was till now the standard work on the subject. Members will be interested to know that Stuart Baker has now in preparation a book on Cuckoos—a fascinating subject on which he wrote a series of articles in the early volumes of the *Journal*, and which Col. Burton recently summarised in his paper on 'Cuckoo Lore'.

Parts XVII, XVIII and XIX of the serial on Beautiful Indian Trees were published during the year. Twenty-eight of our more conspicuous flowering trees have so far been described and illustrated in colour. It is proposed during 1936 to complete the series with description of 3 more species. The Committee have decided to issue this attractively illustrated serial in book form. Orders may now be registered for the book. The estimated cost to members is Rs. 9.

As usual the *Journal* contained a number of shikar articles. Notable among these was Vicomte Edmond de Poncins' Reminiscences of a 'Hunting Trip in the Sunderbunds' in 1892, Mr. Burgess' account of his 'Early Days in Malaya' and Mr. W. S. Thom's 'Experiences of hunting Rhinoceros in Burma'. In the rigid conditions of our day these records of veteran sportsmen who hunted and travelled in the more spacious times of the past make interesting reading.

There can be few places more likely to appeal to a lover of nature than a secluded Salt lick in some remote forest of Burma. Mr. Peacock describes his attempts to photograph Tsaine in these surroundings and illustrates his account with some fine production of his camera. Speaking of Salt licks brings us to the analytical investigation carried out for the Society by Rev. Fr. Caius into the composition of Salt licks. Samples of earth from 39 different salt licks have so far been chemically analysed by Fr. Caius and the results published. During the year, in response to enquiries and as a guide to those who wish to co-operate in the work, the author published an account of the procedure adopted by him in his analysis. Col. R. W. Burton, a very welcome contributor to the *Journal*, published an account of his visit to the Yala Game Sanctuary in Ceylon. The author has visited many sanctuaries in India and Burma but nowhere has he seen so much varied wild life in its natural state as in the Yala Sanctuary. For 36 years the animals in this sanctuary have multiplied in peaceful security; but, without the allotment by the Government of Ceylon of funds for providing increased grazing and water the animals in the sanctuary must inevitably suffer.

During the year the Society published Parts III and IV of the serial on the Wild Animals of the Indian Empire. The parts deal with the Beasts of Prey and cover the Cats and the Civets. In conformity with the previous parts, the serial is beautifully and profusely illustrated with numerous photographs and coloured plates. Once again the Society has to offer its thanks to Mr. F. V. Evans, whose continued generosity has made possible the publication of these articles. As a pendant to the serial we published articles by various authors on the problem of protecting wild animals in various parts of India and Burma. Those who contributed were H. C. Smith (Burma); R. D. Richmond and R. C. Morris (the Madras Presidency); Salim A. Ali (Hyderabad); Major Phythian Adams (Mysore).

In conclusion we should like to offer our thanks to the numerous members who contributed to the Miscellaneous Notes which make an important and very readable feature of the *Journal*. We should like to develop this section of the *Journal* and to print more articles of a popular nature so as to make our publication still more attractive to the general reader. We hope that members will continue to send us their observations and experiences which are often very valuable and always make interesting reading.

The Museum.—The new Natural History Wing of the Museum was completed during the year and the transfer of the collection to the new building was started in December. The work involves the breaking down of several of the large habitat groups, which were so much admired in the old wing. They will be resurrected in a far finer setting in the new wing and a larger number of new groups will be built. During the year an expedition to the Runn of Cutch was organised to acquire material for the building of a group illustrating the nesting habits of the Flamingo. The thanks of the Society are due to His Highness the Maharao of Cutch and Prince Vijayarajji for their generosity in meeting the considerable expense involved. We are also indebted to Capt. Steer Webster who conducted the expedition under the most difficult climatic conditions. As a result, ample material was obtained for the construction of a group which will form a beautiful and striking addition to the Bird Gallery. Mr. S. F. Markham who is on a tour of inspection of Museums in India on behalf of the Museums Association, inspected the New Museum and expressed himself as very pleased with the designing, lay out of the galleries and with the methods of exhibition which were being adopted in the Natural History galleries. He stated that when completed the Natural History section would be the finest of its kind in the East.

Revenue Account.—This account unfortunately shows a loss again this year. The deficit for the last three years was as follows:—

| Year. | Deficit. |
|-------|---------------|
| 1933 | Rs. 2,451 8 9 |
| 1934 | „ 4,847 8 9 |
| 1935 | „ 5,655 12 0 |

Actual receipts this year were Rs. 26,847-7-11 as against the receipts of Rs. 30,050-7-7 in 1934, a decrease of Rs. 3,222-15-0.

This year's decrease in receipts is made up as follows:—

| | 1934. | 1935. |
|------------------|----------------|-----------------|
| Subscriptions | Rs. 22,810 7 2 | Rs. 20,409 6 10 |
| Entrance fees | „ 820 0 0 | „ 640 0 0 |
| Sale of Journals | „ 1,605 0 0 | „ 1,268 11 0 |

Balance Sheet.—The Society's investments are shown as per the last Balance Sheet or at market value whichever is the lower.

Life Membership Fees.—In 1935 the Society received Rs. 700 on account of Life Membership fees. This has been taken to increase the reserve for Life Membership fees. This account now stands at Rs. 48,200. Under our memorandum of association we have to maintain investments in excess of the total of our Life Membership fees. The market value of our investments exceed this figure considerably, as will be seen from the Balance Sheet.

Membership.—During the year 1935, 66 new Members, including 2 Life Members, joined the Society, and 61 members resigned.

The total number of members on the roll of the Society (excluding 195 Life Members) was as follows:—

| | | | | |
|--------------------|-----|-----|-----|-----|
| 31st December 1934 | ... | ... | ... | 970 |
| 31st December 1935 | ... | ... | ... | 973 |

In spite of the slight increase in membership as compared with 1934, there was a decrease in Revenue from subscriptions. This is partly due to the fact that Messrs. Lloyds Bank, who usually pay the subscriptions of Members for the ensuing year in the month of December of the previous year, have not done so for the year 1935. Thus the year 1935 is short of Rs. 1,720 in subscriptions, which went into 1934. The total number of members who paid their subscriptions for 1935 was 848 as compared with 908 in 1934. This shows a decrease in subscriptions of 60 members.

General.—The loss on last year was anticipated, and although the present financial position is sound, we cannot continue to work at a loss for very much longer. As will be seen from the Balance Sheet, we have surplus Assets made up from surplus revenue, etc., which form a Reserve Fund and although every economy possible has been effected for the coming year, it is most necessary to bring in new members. Any co-operation from present members in this respect would be greatly appreciated.

Staff.—The Committee wish to thank the Curator and his staff for the usual good work during the past year.

P. M. D. SANDERSON,
Honorary Secretary.

Mr. Prater then delivered a short lecture on the new Natural History Wing of the Prince of Wales' Museum and the plans for its development. Mr. Prater said that one of the main objects for which the Museum exists is popular education and entertainment, but 90 per cent of the visitors who came to the Museum came there purely for pleasure and so with the majority of visitors the message the Museum had to offer was lost, unless the Museum provided something to rouse their attention and hold their interest. The purpose of the Museum should be to lead people to better ideals and to offer them new points in a way which they could understand and appreciate. The appeal could be made more to the senses than to the intellect, but it could be made in such a manner that in addition to mere attractiveness it should offer food for thought, which was the first step to a higher and more intellectual ideal. There were many ways of telling the story of Nature. Their plan was to choose the beautiful way, the way which leads from an appreciation of its interest and beauty to an understanding of its meaning. We were living in a changing world, the stress and strain of modern life and the demand it makes on the time and attention of the wage-earner does not leave much time for intellectual pursuits or for such side issues as art or natural history. The democratic spirit of the age necessitated a change in the attitude of the Museums towards the public. The older Museums were autocratic, they were exclusive laboratories of science intended for scientists where the visiting public were looked upon as intruders. But modern conditions are bringing about a change in this policy. Museums are becoming more and more dependent on public support, on money voted by the people's representatives, and unless something was done for the people that support would not be forthcoming.

It has been more and more realised that if Museums which stand for the cultural development are to succeed in their mission it is necessary for them to alter their standards, to break down their aloofness and restraint—that attitude which looks upon the public as a nuisance—and to come down to a more sympathetic consideration of the people's wants. It is the duty of the Museum Curator to see that his Museum is worth being interested in, to give his Museum such vitality and pertinence that people will want to be interested in it, will want to visit it and will realise the advantage of supporting it.

Mr. Prater then proceeded to show what was being done in the new Natural History Wing of the Museum in furtherance of this policy, how the whole arrangement of the galleries, the show-cases and the exhibits were planned with a view to creating interest and rousing the attention of the layman. Suitable colour schemes were being adopted in the different galleries with a view to providing an attractive 'atmosphere'. The show-cases were being built and arranged to avoid that feeling of artificiality and cumber-someness which makes so many over-crowded Museum galleries repellent. The arrangement of exhibits on shelves was being done away with to avoid monotony in arrangement. The exhibits themselves were carefully prepared and selected so as to give the visitor a clear outline of the animal kingdom without confusing him with too much detail. Specially interesting to the layman would be the large number of habitat groups with scenic backgrounds illustrating the various phases of animal life. These groups make a direct appeal to people by their beauty, the appreciation of which was common to

all. Nevertheless, when well designed and constructed each of them had a lesson to teach. Apart from illustrating animal life the groups would also illustrate various phases of Indian scenery from the deserts of Sind to the evergreen forests of Assam and the snow-capped peaks of the Himalayas.

In conclusion Mr. Prater said that Mr. Markham who had recently visited the new wing of the Museum expressed himself as very highly pleased with the plans of development and the methods of exhibition now being used in the natural history wing which he said when completed would be easily the finest of its kind in the East.

BOMBAY NATURAL HISTORY SOCIETY.

BALANCE SHEET AS AT 31st DECEMBER 1935.

| LIABILITIES | | ASSETS | |
|--|--------------|---|--------------|
| Rs | A P | Rs | A P |
| <i>Life Membership fees:</i> | | <i>Investments—At holding value or Market value on 31st December, 1935, whichever is lower—</i> | |
| <i>Donations for specific objects unexpended:</i> | | Rs. 35,000 3½% Loan 1947/50 at 10½% ... 35,787 8 0 | |
| Show Cases, Models of Fish &c. in Fridge of Wales Museum—Account No. 1 ... | 1,412 15 1 0 | .. 15,000 5% do. 1945-55 at par ... | 15,000 0 0 |
| Show Cases &c. in New Building, Prince of Wales Museum—No. 2, ... | 18,937 11 0 | .. 10,000 3% do. 1931-54 at 68% ... | 9,800 0 0 |
| Special Journal Fund ... | 3,823 4 0 | .. 14,000 4 ½% Fort Trust Bonds at 77% ... | 10,780 0 0 |
| | | .. 15,000 4 ½% Improvement Trust Bonds at 76% ... | 11,400 0 0 |
| <i>Sundry Creditors:</i> | | .. 5,700 Govt. 5½% Loan 1938-40 at par ... | 5,700 0 0 |
| Printers of Journal ... | 2,514 10 7 | .. 500 5% .. 1945-55 .. | 500 0 0 |
| For Expenses ... | 250 0 0 | | |
| | | <i>Cash—</i> | |
| <i>Surplus Assets:</i> | | With National Bank of India Ltd., Bombay ... | 8,585 0 5 |
| Balance as per last Balance Sheet ... | 30,008 13 2 | With National Bank of India Ltd., London, £73-2-3 at 1/5% ... | 974 13 4 |
| Add—Profits on sales of Securities ... | 7,228 12 0 | On hand ... | 150 0 0 |
| | | <i>Sundry Debtors:</i> | |
| | | Furniture ... | .. |
| | | Balance as per last Balance Sheet ... | 1,652 9 0 |
| | | Less Depreciation ... | 50 0 0 |
| <i>Less—Loss on Revenue Account ..</i> | 5,705 12 0 | | |
| | | <i>Publications, excluding Journals:</i> | |
| | | As certified by Hon. Secretary ... | .. |
| | | Game books, Vol. III: ... | 300 0 0 |
| | | Stock on hand as certified by the Hon. Secy. | 705 9 0 |
| | | <i>Bird Charts and Albums:</i> | |
| | | Stock on hand as certified by the Hon. Secretary ... | 1,563 10 3 |
| | | <i>Butterfly Birds' Lives:</i> | |
| | | Stock on hand as certified by the Hon. Secretary ... | 1,029 8 6 |
| | | <i>Butterfly Books:</i> | |
| | | Stock on hand as certified by the Hon. Secretary ... | 53 8 10 |
| | | <i>Raised and Indian Trees:</i> | |
| | | Stock on hand as certified by the Hon. Secretary ... | 1,514 6 3 |
| | | | |
| | | Total ... | 1,06,675 6 7 |

Note.—A stock of 20,400 old Journals and the Valuable Research Collection and Library of 2,000 volumes have not been taken into account on the Asset side of the Balance Sheet.
We have prepared the above Balance Sheet from the cash book and from the information given to us, and have verified the investments.
In our opinion, such Balance Sheet represents a true and correct view of the state of the Society's affairs according to the best of our information and explanations given to us.

BOMBAY, 2nd March, 1936.

(Sd.) A. F. FERGUSON & CO.,
Chartered Accountants, Auditors.A. FORRINGTON,
Honorary Treasurer.

Dr. **Cr.**
INCOME AND EXPENDITURE ACCOUNT OF DONATIONS FOR SPECIFIC PURPOSES FOR THE YEAR
ENDED 31st DECEMBER, 1935.

| Fund No. 1 | Rs A P | Rs A P | Rs A P | Rs A P |
|--|-------------|------------|--------|------------|
| To Expenditure on Show Cases, etc. | 2,089 7 6 | | | 2,402 7 4 |
| " Balance carried to Balance Sheet | 1,412 15 10 | | | 1,700 0 0 |
| | | 4,102 7 4 | | 4,102 7 4 |
| Show Cases Fund No. 2 | | | | |
| " Expenditure on Show Cases in New Building | 4,424 9 0 | | | 17,784 9 0 |
| " Balance carried to Balance Sheet | 18,992 11 0 | | | 573 11 0 |
| | | 23,357 4 0 | | 5,000 0 0 |
| Special Journal Fund | | | | |
| " Expenditure on Printing Prizes, etc. | 2,559 10 0 | | | 6,282 14 0 |
| " Balance carried to Balance Sheet | 3,825 4 0 | | | 100 0 0 |
| | | 6,382 14 0 | | 6,382 14 0 |

BOMBAY, 2nd March, 1936.

Examined and found correct.

(Sd.) A. F. FERGUSON & CO.

Chartered Accountants, Auditors.

(Sd.) A. FORRINGTON,

Honorary Treasurer.



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