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Vol. XXVI, No. 1

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ZOOLOGICAL SOCIETY BULLETIN

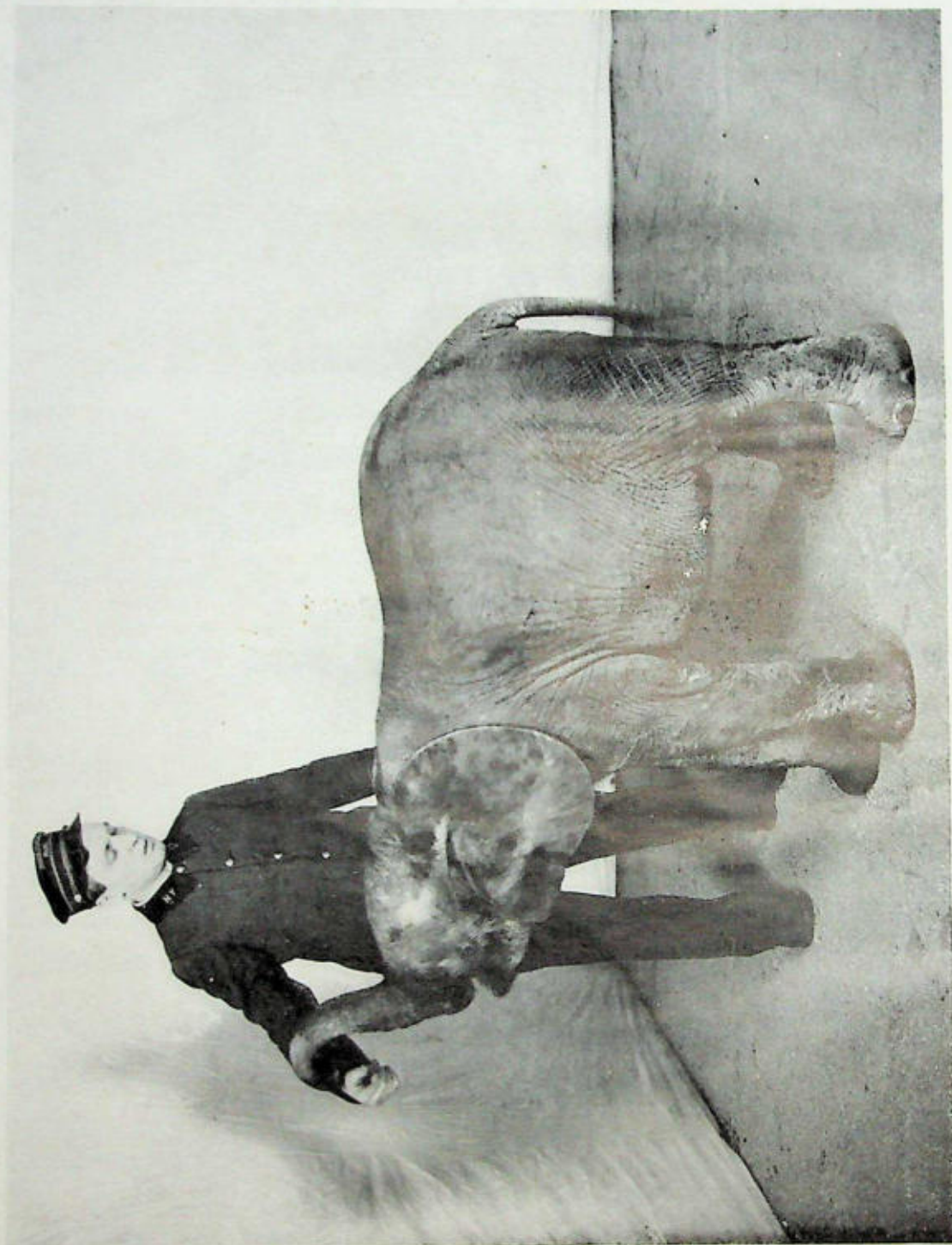
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THE ZOOLOGICAL PARK'S PYGMY AFRICAN ELEPHANT

This tiny pachyderm arrived in December 1922

Photograph by Elwin R. Sanborn

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JANUARY, 1923

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1045

OUR SECOND PYGMY ELEPHANT

By W. T. HORNADAY

AFTER about five years of continuous effort, on December 6, 1922, we achieved another pygmy African elephant, to fill the place in our Elephant House once occupied by "Congo," the type specimen of *Loxodon pumilio*. Our new prize was captured on August 30, at Lake N'Gobi, which is in French West Africa, eighty miles southeast of Fernan Vaz, and about fifty miles from the Atlantic Coast.

The capture was made by Captain E. A. Cunningham, of London, and a small party of natives, and by him the little animal was brought safely to New York. A fractured fibula in the right hind leg necessitated a delay of a month in London for treatment, and during that time our prize was an honored guest of the ever hospitable Zoological Society of London.

Our new pygmy is true to the type of its species. We are having some difficulty in convincing the proletariat-at-large that this animal represents a genuine pygmy species, and is not merely a small baby of a well known large species. We are compelled to iterate and reiterate the declaration that adults of this species do not exceed the standard height of six feet by more than a few inches.

The new one is supposed to be about two and one-half years old. It stands thirty-six inches in height at the shoulder,—which is the size of the baby Indian elephant at birth! It is in excellent general health, but the weakness of the injured leg has led Dr. Blair to provide for that difficulty a brace of steel and leather, to assist nature.

There being no reason for a quarantine, the new arrival was at once placed on exhibition in the Elephant House, where already it has at-

tracted crowds of visitors. Being a little-girl elephant, she has been named "Tiny."

Our first pygmy elephant "Congo," arrived here from the German Cameroons on July 25, 1905. At that time his height was three feet eight inches, and his weight was 600 pounds. He died of a disease that attacked his right fore leg, in July 1915. At that time his height was six feet eight inches, his weight 2,700 pounds, and his long and slender tusks projected twenty-three and one-half inches beyond his lip.

Several years ago, we received a vague report of a small elephant, locally known as the "water elephant," which was said to inhabit the swampy region surrounding Lake Leopold II in the Congo Free State. At last, and very recently this report has been absolutely confirmed by a New York physician named Dr. Carr, who recently has returned from the Kassai River country. He reports that early in the year, acting under a special permit from the Belgian government, an American named J. R. Evans, shot two specimens of the water elephant, and which we now know is nothing more nor less than *Elephas pumilio*, the pygmy elephant. The locality in which the specimens were found may be described as the vicinity of Lake Leopold II, in the western portion of the Congo Free State, and which is about 140 miles northeast of the confluence of the Kassai River and the Congo.

The skin of one of these specimens was presented by Mr. Evans to Lord Walter Rothschild, proprietor of the Tring Museum, England, and the specimen already has been mounted and placed on exhibition. With admirable promptness on the part of Rowland Ward, Ltd., an illustration of this mounted

specimen of "female dwarf elephant" appears on page 478 of the eighth edition of "Records of Big Game."

Mr. Evans' second specimen, a male five feet and ten inches in shoulder height, was presented

to the British Museum of Natural History at South Kensington.

The skin and skeleton of our late lamented "Congo" are in the American Museum of Natural History.



SOUTH AMERICAN TAPIR AND YOUNG

The bizarre markings are a striking characteristic of the young of this species

HUNTING IN CHIRIQUI

By E. R. CUTHBERT

Illustrations from Photographs by Elwin R. Sanborn in the Zoological Park

In our long quest for live specimens of the giant tapir of Central America (*Tapirella bairdi*), good fortune brought us in touch with Mr. Cuthbert, a confirmed wilderness dweller, a keen and correct observer of wild animals, a good jungle naturalist and a tireless hunter of big game. His correct knowledge of species was recognized as a valuable asset and the richness of the animal life of the country wherein Mr. Cuthbert lives will appeal to the imagination of every zoologist. We find the following article, written at our solicitation for the readers of the BULLETIN, of thrilling interest and replete with valuable information.

It is well for the reader to remember that in dense jungles such as those described by the author, the hunter who does not employ dogs finds very little game, and with many of the most important species it is a case of no dog, no game. W. T. H.

I HAVE been living here in Chiriqui, Republic of Panama, for over six years. Boquete, where I now reside, is a little settlement up in the mountains and it is 4,000 feet above sea level. We are thirty-four miles from Boquete to Pedregal, which is the principal port. Steamers make the trip from Panama to Pedregal three times a month. Chiriqui is the most western province of the Republic of Panama, is very thinly populated and very mountainous. This is a rough country in which to hunt. The volcano of Chiriqui looms right above us, and reaches a height of 11,500 feet above sea

level. The climate here is quite cool. The thermometer will show about 60 degrees F. at 6:00 A. M. and about 78 degrees F. at 12:00 M.

I keep a pack of hounds and hunt every week in the year. The game found here is as follows: two kinds of deer, the brocket, and the white-tailed deer; puma, peccaries, paca, tapir, agouti, quail and turkeys. Once in a while a jaguar shows up, but not often.

Tapir: We hunt the tapir (*Tapirella bairdi*) with dogs. They are found on the side of the Volcano of Chiriqui and they have deep trails

nearly to its top. After a chase of an hour or so the dogs bring them to bay in some pool of water in the innumerable mountain streams, where they will fight to a finish. They will charge either man or dog, and are of course dangerous. They kill more dogs in this locality than any other animal that is hunted. The thing to do is not to shoot until one can get a sure shot into the head, and kill the animal instantly, as the dogs all pitch right in as soon as the shot is fired. Should the tapir not be shot, it means that some of the dogs are badly injured, or killed. Nearly all animals run by dogs and brought to bay will fight.

Tapirs like the dense forest. I have seen only one out in the open. They trample down the underbrush and leave a big plain trail, and of course they leave plenty of scent for dogs. Good cur dogs are better than hounds for this hunting as they run faster and they do not bark so much as a hound, so that the quarry will be brought to bay in a shorter time. Of course you lose the music of the pack hounds, which to me is more than half of the sport.

They have one young at a time, which is spotted something like a fawn. The small species of tapir I have not seen up here in these mountains, though I am told by native hunters that they are found in other parts of the country. In Guatemala and Mexico where I hunted for many years I never saw any other than the small species.

The skin of the tapir is very thick, but strange to say it is never exported. The natives cut it up into strips of about two inches wide, then twist them into whip stocks. As soon as the skin is dry, it becomes hard and stiff.

The meat of the tapir is not good, rather insipid I find it, and only certain parts are used. Of course it is fine to feed to the hounds.

Peccary: The collared peccary is very abundant here in Boquete and much sought after by the natives. They prefer the flesh of the peccaries to venison.

Peccaries are hunted with dogs very much in the same way as the tapir, only the peccary will take to a cave or a hollow log after a run of from thirty minutes to one hour.

There is no animal that fights more savagely than a peccary. The only way to make him quit is to kill him. It is necessary to make a sure shot or otherwise you will have your dogs cut up. It is just as quick as any cat—so look out. The peccary is often found in second growth where the forest has been cut down for plant-



OCELOT

Found in Southern Texas, Central America and Northern South America



COLLARED PECCARY AND YOUNG

Peccaries are most satisfactory animals in captivity



JAGUAR

This is the largest and most powerful of all the American cat animals



SAPAJOU'S

One of the best known species of monkeys

ing. It is one of the few animals that can run at full speed through the thickest jungle. He goes through like a knife blade and seldom comes out into the open, which makes the shooting very hard.

A hunter who is not a good snap shot will not have much success here. Your rifle should come up to the shoulder already aimed, as there is no time to hunt for your sights. A carbine is the correct arm. It needs a good scabbard so that it can be carried on your saddle. I use a 30-30 Winchester. Peccaries, as far as I have observed, have two young at a litter. The skins are sold here at twenty-five cents each. I do not know whether they are exported or not, but the natives tan the skins and use them.



OCELLATED TURKEY

One of the three species found in Central America

Jaguar: The jaguar is not very abundant up here in the mountains. I think that they prefer the warm coast climate, and dense jungle.

Their principal food no doubt is the peccary, as their tracks can be found nearly always in the wake of a band of peccaries. Of course they kill cattle and horses, and when once they start this act they will keep at it until killed by some hunter.

The hunter is generally paid from ten to fifteen dollars to hunt and kill them. Dogs are used in hunting the jaguar and they will run longer than the puma before they take to a tree, and also will swim a river, which I have never known a puma to do. I have never known either a jaguar or a puma to attack any one when met in the wood, and I here state that there are no dangerous animals in any part of the tropics, where I have hunted, if left alone.



PUMA

The puma is smaller than the jaguar, and lacks his courage

All this talk of dangerous animals is purely imagination. Most any animal brought to bay and harassed with dogs will fight, not otherwise.

I have seen several skins of the black jaguar, though I have never killed one. I have an idea that it is only a freak.

Puma: The mountains around Boquete where food is very abundant, seem to be the natural home of the puma. They have three kinds of monkeys, agouti, paca, peccaries and the little red deer (brocket) to feed on.

The pumas very rarely trouble cattle and horses. Once in a while they kill a calf or a hog—not often. They are hunted with dogs and soon take to a tree.

Ocelot: We have the ocelot and also several other varieties of the smaller cat family.



WHITE-TAILED DEER

A southern form of the northern white-tailed deer

Deer: The little red deer (brocket) is very abundant also, and lower down the white-tailed deer is found. Of course the best way to hunt these deer is with hounds. Nearly all the shots you will get will be running shots, which in my opinion adds much to the sport. My hounds often run a deer down and catch it. This of course takes several hours to do. When I find a deer at bay in some river, I can generally kill it with my hunting knife.

Paca: The paca is an animal of which you hear very little. It is a rodent of about fifteen to twenty pounds in weight, short-legged and very plump, drab in color and spotted nearly like a fawn. In both young and old the flesh is very tender and is much sought after by all hunters. One seldom seeks them in the day time, as they are nocturnal in their habits. A dog is used to hunt them as they generally are found in caves, which invariably have an inlet and an outlet. They are good swimmers and readily take to the mountain streams. They can stay under water for quite a while when chased by dogs. I believe they have two young at a litter and they seem to breed all the year round. The natives bait their runways and watch with a jacklight for them after dark. The bait used is corn, bananas or a piece of pumpkin.

This is one of the few animals that the natives have failed to tame. It is a most timid animal but when in a cave will fight a dog until killed. Their teeth are very long and sharp, and they cut up a dog pretty badly sometimes.

I believe that animals and birds here in the tropics are much easier tamed than those of the northern hemisphere.

I have seen natives with monkeys, peccaries, agouti, paca, tapir, parrots, (huecheche) a small wild duck, turkeys of three kinds and coati mundis, all so tame as to become a nuisance,—all except the paca. The latter must be kept in a wire pen

Coati Mundi: We have an animal here called the coati mundi. They go in bands of from ten to fifty. They look something like a raccoon and do great damage to a cornfield. They are greater fighters than a raccoon.

When a coati mundi becomes very old, he leaves the herd and becomes, as the native hunter terms it, "a gato solo." These old fellows get very fat and I will say that they are not bad for the table.

Agouti: Agouti are very abundant here, but they are not very good as food. They make a good chase for the hounds, very nearly as good as a grey fox.

Quail: Down on the plains below Boquete are found the bob-white, a small quail; I think that it is called the *Colinus minor*. These birds go in bevsies. Up here in the mountains we have the mountain quail but they do not seem to go in large bevsies. You seldom see more than four or five together.

Turkeys: Turkeys of three varieties are found here in these mountains, but are very hard to hunt.

Pigeon: The band-tailed pigeons are here in great numbers. They breed and stay here all the year 'round.

Quetzal [Resplendent Trogon]: The quetzal is found here at an elevation of between four and seven thousand feet. They build their nests in holes in trees. The two long tail feathers of the male bird can be seen hanging out of the hole. The bird backs out of the hole so as not to injure its beautiful plumes.

Hounds brought from the United States do not hunt well here. They do not get through the jungle as they should do, also, the tremendous barrancas stop them. The only good and really useful dogs that I have now are those that I have raised and trained myself. It is very hard to get a pack of hounds that will really fight and stick to the game.

PRESIDENT OBREGON PROTECTS BIG GAME OF MEXICO

By WILLIAM T. HORNADAY.

ON October 1, 1922, President Alvaro Obregon issued two presidential proclamations which decreed a ten-year absolute close season for the mountain sheep and prong-horned antelope of the Republic of Mexico. It was held that the danger of the extinction of those species was so great that it would not do to wait for the next session of the Mexican Congress one year hence.

President Obregon was everlastingly right. A grave emergency did exist. It is to be feared that the Mexican mountain sheep (*Ovis mexicana*) of the mountains of northern Chihuahua already are extinct, and we know that the dwarf big-horn of the Pinacate Mountains of northwestern Sonora are totally gone. The last American sportsman who visited that region for sheep-hunting, Mr. C. A. Gianini, of Poland, New York, reports that a most thorough search of the entire Pinacate region in October, 1921, revealed not even one sheep, nor even a fresh sign of sheep.

In 1907, the stock of sheep in the Pinacate lava mountains was found to be abundant. Since that fatal discovery, a great many parties of American sportsmen have gone there to kill sheep, and one party slaughtered sixteen specimens, females as well as males. We have known that the flocks were rapidly diminishing, but until now the disturbed state of Mexico rendered it impossible to do anything to secure their safety.

On the Lower California Peninsula a third species of sheep (*Ovis cremnobates*) has been more widely scattered, and therefore less subject to total extinction.

The hold of the prong-horned antelope in Mexico always has been precarious. Like the mountain sheep, the antelope of the United States wandered southward across deserts into Mexico, but finally reached a stopping-place. Like the sheep, they have held on in spite of heat, thirst, coyotes and the absence of good food, in a way nothing short of wonderful. The tenacity and endurance of the mountain sheep and antelope of Mexico form a striking object lesson in the survival of pioneer species under rigorous conditions.

Unfortunately, however, the long-range high powered rifles of American sportsmen and Mexican meat hunters were too much for the sheep and antelopes. Our own men have, so I

believe, done much towards their extinction, but the native hunters have done more. It is indeed high time for some one to put on the lid, and clamp it down.

The penalties provided with President Obregon's decrees have every appearance of determined protection. The fines range from \$50 to \$500, or fifteen days imprisonment, and for second offenders the penalties are doubled. President Obregon is not a man who will permit his decree to be flouted or ignored, or to become a dead letter. All Americans will do well to believe that the prohibition will be enforced. To prevent accidents, the news was wired to Nogales, Tucson, Ajo, Calexico and San Diego.

But the above is not all.

On October 19, President Obregon issued a third decree forbidding any further exploitation of the forests and wild animal life of the Island of Guadalupe by private individuals, and specifically reserving all the natural resources of that island and the territorial waters surrounding it to the government of Mexico. The decree further orders the appointment of such protective agencies as may be necessary.

The most important effect of this decree is its prohibition of all further commercial slaughter of the elephant seals now inhabiting the shores of that island and numbering at this time about one thousand individuals. At one time it was greatly feared that the oil hunters would exterminate the species before its protection could be secured.

This grand coup in big game protection, the most sweeping and dramatic occurrence since the signing of our migratory bird treaty, was due to the initiative of a distinguished Mexican zoologist, Professor A. L. Herrera, Director of the Biological Studies of Mexico. Last August, Professor Herrera spent a week at the New York Zoological Park, studying that institution and American methods and results in wild life protection. On departing he declared his intention to do all possible towards securing a long close season for the sheep and antelope of Mexico and the elephant seals of Guadalupe Island.

We understand that two or three other Mexican scientists who during the past summer were engaged in scientific work on the west coast of Lower California, contributed important services to the elephant seals of Guadalupe Island. The names most prominently mentioned in this connection are Professor Carlos Cuesta Terron, Professor José M. Gallegos and Sr. Enrique

Gonzales. Mr. A. W. Anthony of the San Diego Society of Natural History and Dr. G. Dallas Hanna of the California Academy of Sciences were two American members of the party who cooperated in the scientific investigations.

The Permanent Wild Life Protection Fund has conferred its gold medal for distinguished services upon President Obregon and also upon Prof. Herrera for their action in behalf of the three important species of Mexican mammals concerned in the three decrees above reported.

THE LEMMINGS OF POINT BARROW, ALASKA

By CHARLES D. BROWER.

I AM enclosing a picture of a banded lemming, which I have had since February. When I got the animal it was in its white winter pelage. Now it has lost almost all the white and changed to summer colors. It certainly has been interesting to watch the little lady. She is quite tame. I cleaned out a show case and fixed it up as nearly as possible to reproduce what lemmings are used to out-of-doors, all but the snow, and that it does not seem to miss because every day I put in a large pan full of snow and after playing in it for a time it leaves it and goes to its nest.

Its favorite food is rolled oats, raisins, prunes, grass roots and bark of small willows. I put a large glass candy-jar in the case containing plenty of grass dried and immediately she started to build a nest. Whenever it is necessary to clean the place, I take the nest away and at once she builds another. By putting plenty of straw in the case she has fine runways. I keep sand in a box to which she goes the same as a cat would and does not make a mess anywhere else.

About ten days ago some of the boys found a young one of the same species about as large as my thumb and brought it to me. This I put in the cage with the large one. At first she rather objected to it, fought it and drove it away from the nest, but as the little one did not fight back she seemed to finally adopt it and now is mothering it as though it were her own. The little fellow is in his young pelage colored almost mouse grey, only his fur is soft and fine like spun silk. It is amusing to watch them play and see the female lick the little one all over and fix his fur.

The banded lemmings apparently have their young in the winter as this winter I received two very small ones that were found and brought

here in January. Unfortunately both were dead. A few years ago, we hardly ever saw a banded lemming here, although the brown or common variety was numerous. During the last few years the banded seem fairly plentiful.

Once, many years ago (to be exact, it was the spring of 1887, early in June) we had a vast migration of the common lemming. They came from the southeast,—how far I do not know,—but it was about eight miles across their trail north and south. They were about a week passing this station. They travelled northwest and went out upon the sea ice, not stopping for the water but jumping from the ice and swimming until they were drowned. We were whaling at the time and off shore our boats passed through whole winrows of dead lemmings every little while. They seemed collected as though they were brought together in a tide-rip. The members of the main body were drowned, but around us the brown lemmings were quite plentiful all the rest of that year.

TRUMPETER SWANS IN BRITISH COLUMBIA

By HOYES LLOYD

*Supervisor of Wild Life Protection,
Canadian National Parks.*

A SMALL flock of trumpeter swans, representatives of a magnificent species which was once thought to be extinct, is protected on its wintering grounds in British Columbia by the Canadian National Parks Branch of the Canadian Department of the Interior and by the Provincial authorities. Severe penalties for molesting these birds are provided by the Migratory Birds Convention Act.

There were nineteen trumpeter swans on this wintering ground during the winter of 1919-20; nine were there during the winter of 1920-21, and eleven were there during the winter of 1921-22. Local sentiment is much in favor of the protection of these birds, and there is some little hope for the species as a whole because other wintering grounds in Canada are known. The Parks Branch has employed a local guardian for this flock ever since the presence of these birds on this wintering ground was reported to the Branch.

The decrease in the number of wintering birds during the past two winters may have been caused by the fact that there was believed to be much open water to the north of this wintering-ground, although the fact that only two cygnets were present during each of the last two winters looks rather serious.

New York Zoological Society



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☐ A PUBLIC ZOOLOGICAL PARK. ☐ A PUBLIC AQUARIUM. ☐ THE PRESERVATION OF OUR NATIVE ANIMALS. ☐ THE PROMOTION OF ZOOLOGY.

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ELWIN R. SANBORN, Editor

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Departments:

<i>Mammals</i>	<i>Aquarium</i>
WILLIAM T. HORNADAY	CHARLES H. TOWNSEND
<i>Birds</i>	<i>Reptiles</i>
LEE S. CRANDALL	RAYMOND L. DITMARS
WILLIAM BEHR, <i>Honorary Curator, Birds</i>	

Each author is responsible for the scientific accuracy and the proof reading of his contribution.

VOL. XXVI JANUARY, 1923 No. 1

THE HOWARD EATON TRAIL.

Among the many human documents that come to the desk of the Director of the New York Zoological Park from far distant points, many are too good to be lost to the public. Unfortunately, however, no adequate medium is available for any considerable number of publications of this kind, and, therefore, we regretfully file away a great many letters of thrilling interest which we would gladly give to the readers of the BULLETIN if we could.

As an illustration of this, we present, precisely as it was written, the following communication from the Superintendent of Yellowstone Park.

W. T. H.

Office of the Superintendent.

Yellowstone Park, Wyoming,
October 31, 1922.

My dear Dr. Hornaday:

My friends, the Eaton brothers, tell me that you have in preparation an article on the late Howard Eaton, and they advise me that they are writing you about our memorial trail, the "Howard Eaton Trail," which we built this year paralleling the loop road system of Yellowstone Park—a great trail system that has been built

in part for years but never wholly completed to touch all points of interest and at the same time make it possible for saddle horses to keep off the automobile road. There are a few sections of this trail still to be improved, but it is for all intents and purposes finished.

I am sending you a map showing you approximately the route of the trail. We put up over two hundred signs entitled "Howard Eaton Trail," and at some point on the trail we expect to have a sign detailing the life work of Howard Eaton, particularly his game protective activities.

I cannot imagine a finer memorial to Howard than this trail and I know you will want to mention it in your article. The trail will be approximately 150 miles in length and many sections of it are as spectacular in the scenic views they present as any trails in any national park.

Yellowstone and Glacier Parks, and even the states of Montana and Wyoming, are not just exactly the same since Howard Eaton passed away. I have missed him terribly this year and the absence of his horseback party left a great void in Yellowstone season. Howard Eaton was a wonderful man—a nature lover of the highest type, a devoted friend of wild life, a fighting conservationist in a land where only that kind of a protectionist could be effective, and above all, he was a royal good fellow, and because of his generous heart, genial smile, ready wit and devoted friendship, could not have anything but friends—I have never heard of his having an enemy.

Should you mention the Howard Eaton Trail and want to give credit for the origin of the project and the name, please do not give it to me alone, because it was more the idea and work of Chief Ranger Samuel T. Woodring, of Yellowstone Park, that accomplished this memorial than anything that I did, although, of course, the idea appealed to me from the start and had my earnest consideration and attention from the time we first undertook the project.

Sincerely yours,

HORACE M. ALBRIGHT,
Superintendent.

OUR NEW MUSK-OX HERD

Again the Zoological Society has achieved a musk-ox herd. About one year ago an order was placed with Mr. Johs. Lund, of Aalesund, Norway, for a collection of musk-ox calves, provided any were caught by the whalers of Norway during their spring cruise in 1922. During the previous year no calves had been caught on the coast of Greenland because the heavy ice prevented the whalers from reaching the land.

This year, however, conditions were much more favorable. With a certain prospect of the sale of several calves if they could catch any, the whalers took a recess from their regular whaling operations, landed at Franz Joseph Fjord, and captured nine musk-ox calves, the



STUDYING THE SLOTH AT KARTABO
An island was formed by digging a trench or dry moat, and sloths of various ages were kept in a pleasant state of captivity for months



TROPICAL RESEARCH STATION
OF THE
ZOOLOGICAL SOCIETY
BRITISH GUIANA



Contribution, Number 122.

THE LEISURELY SLOTH

By WILLIAM BEEBE

IF we tell a person that the Three-toed Sloth is an Edentate mammal of the Subclass *Eutheria*, autochthonous to the Neotropical Region, our efforts at conversation may be coldly received. If we make the statement that the sloth is the slowest animal in the world, we at once have our listener's attention.

During the past summer I spent considerable time in studying the Three-toed Sloth at the Research Station in Guiana, and was able to watch many adults, half-grown individuals and new-born young. Lacking wire for a large enclosure, I devised a scheme which was quite successful. I had a circular trench or moat dug in the compound of the bungalow, three feet wide and three deep, enclosing a grassy island fifteen feet across, and planting several small trees on this, I hung up whatever sloths I wished to study and left them to themselves. Morning and night, branches of their food leaves, *Cecropia*, were provided, and from the sloths' point of view life had no more to offer.

In preparing my material for monographic publication I reviewed the writings of early travellers, and found many amusing tales. Like any pronounced characteristic of sloths or men, the deliberateness of action and life of these creatures was greatly exaggerated. One of the quaintest accounts was written four hundred years ago by Gonzalo De Oviedo. He says in part, "There is another strange beast the Spaniards call the Light Dogge, which is one of the slowest beasts and so heavie and dull in mooving that it can scarcely goe fiftie pases in a whole day. Their neckes are high and streight, and all equall like the pestle of a mortar, without making any proportion of similitude of a head, or any difference except in the noddle, and in the tops of their neckes.

They have little mouthes, and moove their neckes from one side to another, as though they were astonished: their chiefe desire and delight is to cleave and sticke fast unto Trees, whereunto cleaving fast, they mount up little by little, staying themselves by their long claws. Their voice is much differing from other beasts, for they sing onely in the night, and that continually from time to time, singing ever six notes one higher than another. Sometimes the Christian men find these beasts, and bring them home to their houses, where also they creepe all about with their naturall slownesse. I could never perceiue other but that they live onely of Aire: because they ever turne their heads and mouthes toward that part where the wind bloweth most, whereby may be considered that they take most pleasure in the Aire. They bite not, nor yet can bite, having very little mouthes: they are not venemous or noyous any way, but altogether brutish, and utterly unprofitable and without commoditie yet known to men."

This delightful naturalist confuses the sloth with one of the giant tropical goatsuckers which calls only in the night; and while I have known a sloth to go six weeks without touching food, yet there comes a time when something more substantial than "aire" is required. After weeks and months of study from every point of view I find the sloth far from "utterly unprofitable."

I concentrated on the Three-toed species as it will not live out of its native land. It absolutely refuses all food except the leaves and buds of the *Cecropia*, and the extinction of this tree would probably mean the passing of this race of sloths from the earth.



ADULT THREE-TOED SLOTH
Profile of the head

The sloth is adapted to a life of hanging from or climbing up branches, and on the ground can only hook itself slowly along to the base of the nearest tree. Except when actually travelling through the trees, it does not however, keep to an inverted position. While so helpless on the ground, it swims readily. I have photographed a sloth swimming to shore and have captured no fewer than twelve of these animals which were making their way across a mile wide river.

Where Cecropia trees are abundant, sloths will sometimes spend many weeks in one limited locality, but on the other hand when they wish, they can cover considerable distances. At certain seasons of the year, there is a migration of sorts, and all the sloths in a district will be found moving in one general direction.

I once caught a sloth and after keeping it



YOUNG THREE TOED SLOTH
Head of a month old sloth

for five days I tied a metal tag to its leg and shaved two patches of hair from the sides of the back, on the edge of the orange dorsal spot. I liberated it in the jungle and forty-eight days later it was brought to me by an Indian from his clearing a long distance off, and across the Mazaruni River. To reach this spot the sloth must have gone west to the river bank from the spot where I liberated it, then turned south-west and taken to the water about two miles further up river, then swam a mile west and down to the spot where it was seen to come ashore. The metal tag was gone but the shaved spots were unmistakable. The total distance covered was at least four miles of jungle and one of river. Allowing a single day for the latter feat, we have an average of about one hundred and fifty yards of direct travel for each of the



THREE-TOED SLOTHS
Heads of adult female and young

remaining days. As there was a full moon during the interval it is probable that the animal made some of its progress at night.

The human failing of exaggeration in the estimate of speed is as evident in the case of slowness as of rapidity. A race horse may seem fairly to fly over the ground, until pulled down to the actual record by a stop watch, and to all the earlier observers, the fact of the unusual slowness of sloths led to the most ridiculous estimates of their speed. One man said that a sloth spent its whole life on a single tree, the leaves sprouting on one branch before it had finished feeding on another.

Of those under my observation, a mother sloth on the ground, speeded up by the calls of her infant, made fourteen feet in one minute, and while I have known this to be considerably



ADULT THREE-TOED SLOTH
Method of progression on the ground

surpassed, yet it is a fair average of twenty tests with half as many individuals. This corresponds to a mile in six and a half hours. In the trees this speed is increased to two feet a second. But all sloths' records are shattered by swimming. An average is the feat of a male not particularly vigorous, which swam sixty-five feet to the nearest bush on shore in two and a half minutes. This is two and a third feet a second, which is to say that, ignoring all contrary currents and tides, a sloth, keeping up this rate of progress could cross a mile stretch of river in less than thirty-eight minutes.

Dully tolerant as sloths are of whatever life or fate may bring, they are extremely intolerant of one another. If several are placed on a large tree for observation, one will always make it uncomfortable for the others, but in a small cage it is as good as murder to put two sloths together, especially if they be females. Males, or a male and a female, will usually live grudgingly together, giving one another occasional

hooks with their claws, but two female sloths present the most unpleasant sight imaginable. After a brief sparring, one gives up and flees, or rather creeps, and never after attempts to defend herself. The other may for a time languidly feed, or sleep for hours, but it never

forgets its companion, and sooner or later, climbs toward the hunched up unfortunate, and deliberately begins to inflict as much damage as possible. Hook after hook is made, and the mysterious part is that the persecuted sloth permits herself to be unrolled and systematically clawed, a single swing sometimes tearing part of the tender skin of the nose. Wailing at each attack, the hopeless creature lets go and lies flat on her back, with all her vulnerable parts exposed, apparently awaiting death at the will of her companion sloth. The attacker tries, usually vainly, now and then to bite. Only once I saw one get hold of a hand instead of a mouthful of hair, and from the way it was wrenched away and from the ensuing wail, the flat teeth



IMMATURE THREE-TOED SLOTH
An embryo within a few days of birth

must be able to cause considerable pain. I have never allowed such an attack to continue, it is too horrible, and I know of no other mammalian conflict which is so abhorrent. The idiotic, emotionless faces of the two sloths, one emitting a series of plaintive wails through the nostrils and without attempting either to ward off blows or to retaliate; the other slowly and systematically setting to work to destroy her sister: it is decidedly the least attractive side of sloth life.

Every muscular movement, sensory reaction and mental process is slowed down in these animals; their lives are spent wholly in low gear. They are the personification of slow deliberation, and only from an anthropomorphic bias can they be termed lazy or slothful. A turtle shows sometimes the slow, deliberate movements of these mammals, or a heron stalking a fish; a chameleon also in its syndactyle climbing; but a turtle or a heron can hurry if they choose, while to a sloth, haste is inconceivable. When, however, a sloth lifts itself from branch to branch, drawing its whole weight upward with three fingers and no effort, or, stretching far across an open space, brings body and legs after without shock or swinging impetus, one is forced to admiration, as in the supremely graceful, effortless feats of superlative acrobats, or the analysis of movement of some animal in swift action in a slowed-down moving picture.

A jerk or sudden movement is unknown to a sloth between birth and death. The nearest approach is what pugilists would call a short-arm hook, with which the sloths endeavor to defend themselves, and the exertion of this is so great that if they miss the object aimed at, the impetus often completely upsets them.

The reputed danger of being caught in the grip of the long curved claws is imaginary, for while they can give a severe pinch, yet they cannot cut through the skin unless an attempt is made to tear the hand away. The curving slice which they occasionally give is a different matter and can inflict a deep cut. Their method is slowly to reach forward in the direction of the enemy and then bend backward, curving the arm around with claws half flexed.

When fully enraged, having mentally attained the emotional level of annoyance of other wild animals, male sloths will, at this stage, slowly reach forward with the head, open the mouth and attempt a languid bite. I have known one to bite its own wrist, mistaking

it for my hand. I have not experimented with the efficiency of this mode of assault, but probably if given time and perfect convenience of grip, they could chew enough to do considerable damage. Such defence is pitiful against the swoop and talons of a harpy eagle, the claws of a jaguar, or the crushing coils of a boa constrictor.

Every Three-toed Sloth has its individual expression, but this never changes under stress of emotion, hunger, anger, sleep, or even when nearly drowned after hours of swimming; always there is the same, humanly-speaking, smug, wide-eyed, vacant outlook upon life. In what the sloth conceives to be the last extremity, there comes a shrill, heart-rending whistle through the nostrils, accompanied by not the slightest quiver of muscle or shifting of feature.

Interest in the strange life and ways of adult sloths, and the disarming charm of infant sloths are very liable to obscure the real status of their mentality, and after experiences with newly caught animals and birds which dash themselves against their cages, or mope and perish from no reason which we can discover, we are inclined to be over-enthusiastic as to the philosophic acceptance of captivity by sloths. But when we divorce from the question of their psychology all sentiment and false tameness, we are face to face with the fact that they have achieved a niche for themselves where they live, thrive, and increase with the very least possible development and specialization of sensory perceptions and mental processes. Buffon once wrote "ces paresseux font le dernier terme de l'existence dans l'ordre des animaux qui ont de la chair et du sang une defectuosite de plus les aurait empeches de subsister." A sloth in Paris would doubtless fulfill the prophecy of the French savant, but on the other hand, Buffon swinging upside down to the branch of a Cecropia tree in the jungle, would expire even sooner!

MRS. MYERS' "WESTERN BIRDS" BOOK

After years of work with western birds, and in defense of them, Mrs. Harriet Williams Myers, vice-president of the California Audubon Society, has written an attractive and valuable book about them. (The Macmillan Company). It will please not only the grand army of bird lovers, but also the greater army of people who

love California. The illustrations are numerous and adequate. This volume is plainly intended to interest and inform the general reader, but of scientific classification there is quite enough. It is the millions who need to be instructed, not the scientific few.

We heartily congratulate Mrs. Myers upon the character and appearance of this volume.

W. T. H.

A WILD CONNECTICUT SANCTUARY

By RICHARD OUTWATER, JR.

AS many other and better writers have remarked, it is exceedingly remarkable how quickly the wild folk learn to know of places where they are assured of protection and where unhampered they may return to their natural state. Seemingly the nearness of man and his works are forgotten or at least put aside in the intense joy of finding a refuge where the bang of guns and the snap of traps comes to them only as a bitter memory.

In Greenwich, Connecticut, there is a wooded tract, locally known as Anderson's Woods, bounded on the north by the Boston Post Road, on the south by the New York New Haven and Hartford Railroad and on the east and west by busy thoroughfares where traffic is practically incessant and where the screech of the auto siren is seldom absent. A goodly woodland this, with a lake and divers small ponds and streams where members of the finny tribe abound. A tract of ancient, uncut trees, of undergrowth and thicket, a place where barbed wire is a thing unknown and where the few faint trails are rapidly becoming overgrown for want of use.

Here one may behold the flash of wing or see the furry creatures in the thickets.

To one's ears come the cry of bird and the splash of the bass in the lake. The place is teeming, intensely alive; a place of joy unconfined. A casual observation nets the following list of living creatures:

Raccoon, muskrat, weasel, cottontail, skunk, gray fox, red fox, woodchuck, red squirrel, gray squirrel, chipmunk, varying hare, various bats, mice, moles and shrews.

Canada goose, black duck, wood-duck, mallard, bittern, sea gull, little green heron, great blue heron, loon, belted kingfisher, barred owl, screech owl, great horned owl, crow, red-tailed hawk, ruffed grouse, woodcock, quail, blue jay, dove, catbird, bluebird, robin, red-winged black-

bird, downy woodpecker, red-headed woodpecker, flicker, kingbird, English sparrow, song sparrow, Baltimore oriole, purple grackle, martin, barn swallow, wood thrush, house wren, redbird, scarlet tanager, chickadee, snowbird, and a host of others.

Also, garter snake, water snake, black snake, green snake, little brown snake, milk snake, red bellied snake, and numerous frogs, toads, newts and turtles and a great variety of the native insect life.

AMERICA'S LEAST KNOWN BIG GAME ANIMAL, THE GIANT TAPIR

Preliminary Notice by WILLIAM T. HORNADAY.

I CALL the giant tapir (*Tapirella bairdi*) our least known big game animal, not because it is absolutely unknown, but because to 990 out of every 1,000 persons in the United States, it is as much unknown as the unicorn. The other one-tenth of one per cent. know it vaguely and forgetfully from the four solitary mounted specimens that exist in the museums of the United States, and from hearsay, plus a trace of observation in the animal's own territory.

Fancy, if you can, an animal as heavy at its maximum as a small horse, almost impossible to a sportsman who has no dogs, and yet quite reasonably plentiful in its own territory, remaining for the past two centuries more completely unknown to the American people than the extinct imperial mammoth and the latest discovery in dinosaurs.

Throughout fifty years of museum making in the United States, only five preserved specimens exist today on exhibition. These are distributed as follows: one mounted skin each in the Carnegie Museum at Pittsburgh, the Field Columbian Museum at Chicago, and the Public Museum in Milwaukee; one skeleton in the United States National Museum, and one mounted head in the National Collection of Heads and Horns at the Zoological Park. But there is a worse record than this to follow:

Up to this time only two live specimens ever have reached any of the zoological gardens of the world. In 1865 a spotted and striped baby giant tapir found its way into the London Zoo, and lived there for five weeks. In 1922, after four or five years of diligent inquiry and persuasion, the New York Zoological Park achieved a young specimen which reached the Park alive



IMMATURE GIANT TAPIR, *TAPIRELLA*
BAIRDI

This young animal was received at the Zoological
Park October 7, 1922

but well loaded up with pneumonia, and survived only five days.

Truly this record reveals the humiliating fact that the directors of the world's zoological gardens and the curators of America's museums have been slow on the draw in regard to *Tapirella bairdi*. We present herewith an illustration of the really fine specimen that has for some years been on exhibition in the Carnegie Museum at Pittsburgh. Dr. W. J. Holland, for a quarter of a century the Director of that institution, has a keen eye for zoological rarities, and the number that he has achieved for that institution is really remarkable. I have found that it is not safe to assume that a rare animal does not exist in any of the museums of the United States until we have sounded out Pittsburgh. But the Field Columbian Museum is ready to answer present when giant tapirs are called for, and its mounted specimen is sufficiently like the one in Pittsburgh that it might well pass as a duplicate.

In the BULLETIN of the Zoological Society for May 1922, we published an illustration of the large and beautifully mounted head of the *Tapirella bairdi* that was shot in February 1916 on the Isthmus of Panama by Colonel David T. Abercrombie. With commendable foresight and diligence the sportsman carefully preserved the skin of the head and neck, and also the skull of the specimen that he shot under very interesting circumstances. A long and narrow island was selected as the theatre of a hunting operation. Across the middle of it, from side to side, a twenty-foot wide swath was cut through the jungle, so that animals crossing it might be seen of man. Then a game drive was made from the farther end of the island, and when this tapir charged into the open it fell at close range to Colonel Abercrombie's rifle. He and his companions estimated the weight of the specimen at 720 pounds; and in view of Colonel Abercrombie's extensive experience in the Quartermaster's Department in the business of handling weight goods and loading ships, I am convinced that his estimate of the weight is sufficiently near the mark that we can accept it as authoritative. Colonel Abercrombie carefully measured the dead animal in the flesh with the following results:

- Length of head and body 7 feet 1 $\frac{3}{4}$ inches.
- Girth of neck 2 feet 5 inches.
- Girth behind forelegs 4 feet 11 inches.
- Overhang of nose beyond chin 6 $\frac{1}{2}$ inches.

The height of the mounted specimen in the Field Columbian Museum is 37 inches.

For nearly five years we have been importuning residents of Panama, and travellers thereto, to take all the measures that were necessary to obtain and deliver to the Zoological Park one or more specimens of the Baird's tapir. These requests were supplemented by offers of substantial sums of money for the first specimen. After innumerable failures and disappointments, at last a combination of dogs, Indians and white men succeeded in obtaining a baby tapir, and keeping it alive for a few months. As soon as practicable it was shipped to New York, feeding in transit on sugar cane, and it finally reached us on October 7, 1922. The frail little creature, frail because of unsuitable food and a long, hard journey in weather too cold for its constitution, stood twenty-one inches high, measuring thirty-two inches in length of head and body, and weighing thirty-eight pounds. Its coat of hair was woolly in texture, quite abundant and so dark brown in color as to make the animal seem almost black. It was not only

tame but affectionate, and refused to drink its portion of milk save when a finger was properly located in the baby mouth. The specimen was a female. Although it ate heartily and did its utmost to make good, the pneumonia curse of young animals coming from the tropics to the United States in cold weather, had taken possession of her small lungs, and on her sixth day in New York she suddenly expired. The photograph of this specimen, taken in Panama just previous to shipment, is shown herewith.

Naturally our efforts to reduce some specimens of the giant tapir to a state of comfortable captivity in New York are continuing, and we have excellent reason for hope that the coming spring will see us in possession of at least two more specimens. Mr. E. R. Cuthbert, whose very interesting article on the wild life of Panama appears on other pages, will take the warpath in January, and we are persuaded that he will not stop short of success.

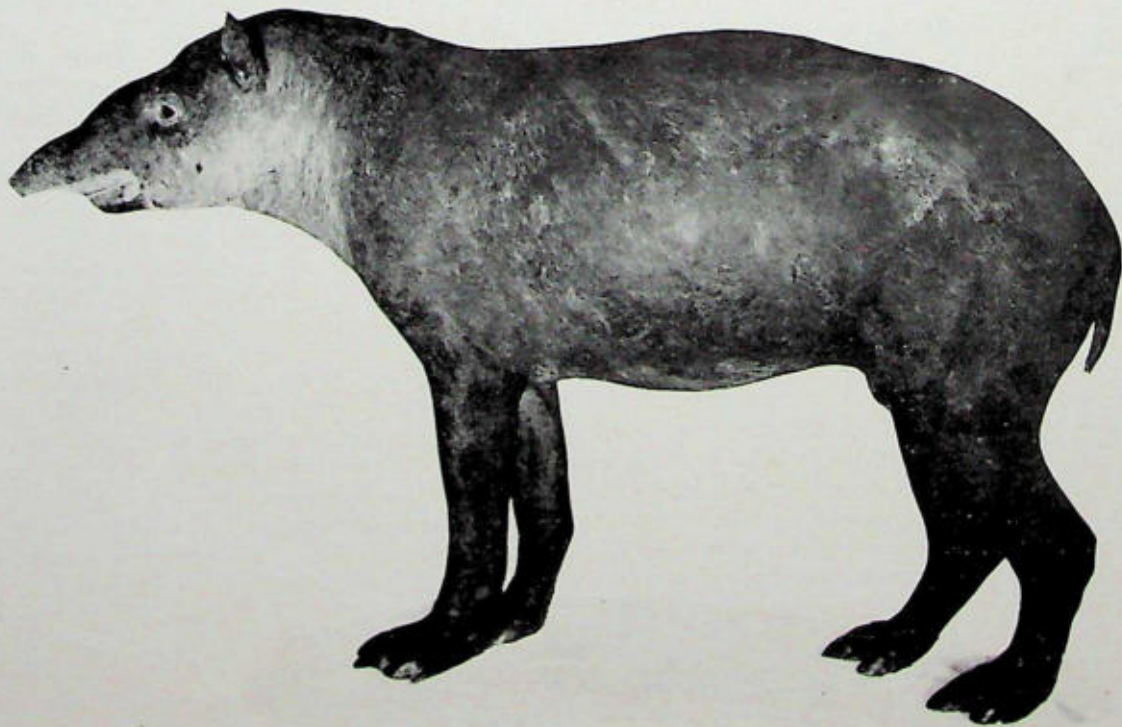
Two species of *Tapirella* are found in Central America,—*Tapirella bairdi* and *Tapirella dowi*; the latter being known as Dow's tapir. The former is found from the Panama Canal Zone

to the State of Vera Cruz, Mexico. Dow's tapir is accredited only to Guatemala and Nicaragua. Concerning the distribution of both species, much remains to be revealed. There are reports to the effect that both these species sometimes attain a weight of 1,000 pounds or more, but this high figure requires confirmation. There is one sensational report of an individual which weighed 1,400 pounds, but we are inclined to place that animal in the same category as twelve-foot lions and tigers, and fourteen-foot Alaskan brown bears.

The color of the adult Baird's tapir is quoted by D. G. Eliot as "dark redish brown."

At all events the Bairdi and Dowi tapirellas are the giants of the tapir groups, and as such they merit close acquaintance and serious consideration.

It goes without saying that it is high time for our museums to send collectors to Central America, who will collect and study these species as they deserve, and enable our institutions to place adequate habitat groups and maps of distribution before the millions of people of our country who are interested in the big game of the world.



BAIRD'S GIANT TAPIR *TAPIRELLA BAIRDI*

From a mounted specimen in the Carnegie Museum, Pittsburgh



CAPE FUR SEALS

The Society recently acquired four specimens. At this time they are quartered in the open pool near the Reptile House. If the climate proves too severe, they are to be transferred to the Antelope House, where a special enclosure has been prepared.

Photograph by Elwin R. Sanborn



BERNARD'S KANGAROO

The Society's collection of kangaroos is one of the most complete in the world. Keeper Riley has been very successful in the breeding and care of these animals, and it is one of the most satisfactory exhibits in the Park. This specimen is one of the later additions to the collection.

Photograph by Elwin R. Sanborn



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A TREE YUCCA IN THE MOJAVE DESERT
These curious forms of characteristic desert vegetation shelter a small lizard with adhesive digits, which is found only upon them in this immediate vicinity

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VOLUME XXVI

MARCH, 1923

NUMBER 2

REPTILES OF THE SOUTHWEST

By RAYMOND L. DITMARS

Illustrations from photographs by the Author.

A VAST area of desert occupies the southwestern portion of the United States, its broad, solemn expanses extending northward through Nevada. A desert unlike any other in the world. Its far flung boundaries may be likened to a gigantic frame, encompassing row upon row of scenes of the utmost grandeur and loveliness. To the east are the Rockies, the sweeping mesas and the region of indescribable colors, eroded gorges and canyons, where rivers have cut their way deeply through the pages of Time. The western side of the frame is no less majestic. Here are the snow-capped Sierras and the long, narrow state of California, its climate mellowed by the soft air of the Pacific. Just west of the southerly end of the mountain boundary are the orange groves—enchanted miles of them and only a few hours travel through the passes directly into the desert itself.

Our great desert areas differ from those of other lands in possessing a diversity of surface. There are tremendous areas of sand; but rising in thousands of scattered points, some irregularly, others in waves and ranges, are tablelands and mountains with predominating surfaces of shattered rock and ancient lava. That the sandy reaches are rich in the elements that support plant life is apparent in areas where a few showers occur in the winter and spring. These areas are usually near the chains of rocky upthrusts, or foothills of the marginal ranges, and here the characteristic desert flora flourishes in a variety of fascinating forms. Stretching away from these garden spots, which break into a profusion of flowers for one brief period each year—the spring—are the solemn wastes. The cessation of plant life towards the barren sands is marked by the tenacious sage,

in round and regular patches, as equally spaced as if distributed over a vast plantation, thence becoming smaller and farther apart in an expanse of sand like the surface of the sea. Throughout this desert world there is characteristic animal life, strange, marvellously adapted for this unique environment of white-hot sun and lack of water. In order to exist a great part of their lives without shelter or retreat, the desert animals have passed through evolutionary processes far more remarkable than animal life of the fields and thickets.

One of the best bases for approach into typically American desert is San Bernardino, California—in the heart of the orange grove region. Behind the city rise the San Bernardino Mountains with several of the peaks over 10,000 feet elevation. There are two gateways into the desert, one leading into the Mohave and the other to the great reaches that stretch away into Arizona. Each is quite distinct in its novelties. The gateway into the Mohave ascends the San Bernardino range by a superb auto road. A tangle of peaks and precipitous canyons greets the eye during the gradual climb, but upon reaching the top of the grade there is a view of sterile hills and eroded gorges that causes the spectator to gasp in wonder. As the car tops the completion of the ascent and begins a gradual coast down grade, the change of flora is as abrupt as if one were entering a botanical garden. Desert sage of various heights and forms and in hues from blue to pale green and gray springs into view in scattered patches until it dominates the flora, but mixed with it are patches of greasewood eight and ten feet high, and then in silhouette against the sky come the spectral tree yuccas, the only home of a curious little lizard with soft, granular skin.



HORNED "TOAD"

This is a stout-bodied lizard

The other route out of San Bernardino into the desert is much longer, but more spectacular in preparing the observer step by step for an impressive experience. It leads through an immense and broad gateway—the San Gorgonio Pass—with steady running, on the level, between two great mountain ranges terminating in an alley some miles in length where the traveler leaves one realm to enter another, and through which a mighty wind is always rushing owing

to the disturbances of atmospheres where heated air seethes upward over hundreds of square miles of surface.

On one side is the San Bernardino range dwindling to a procession of sterile and forbidding hills, while on the other rear the majestic slopes and peak of Mount San Jacinto, a sheer 10,000 feet above the pass. There is a variety of cacti and small tree yuccas. On continuing through the pass the vista of the desert is disclosed like a golden sea. The heat rapidly increases. In August the puffs of wind feel as if propelled from a stove; yet the upper slopes of San Jacinto show canyons with patches of snow.

The massive gateway is heralded by a strong wind. Those who know the region well declare it never ceases to blow, although its forces are varied. It has whipped the top from many an automobile and as quickly as an umbrella is wrenched from one's hand in a gale. The power of this wind is indicated by two great golden hills on each side of the pass at the immediate entrance to the desert. These hills are sand drifts and at one side they sheer off as a precipice like the sharp edge of a snow drift magnified a thousand fold.

We entered this pass with a light car, equipped with plenty of water bags. The



ENTERING THE DESERT THROUGH THE SAN GORGONIO PASS

A heavy wind nearly always blows through this pass. The highlands in the rear are the dividing ridges of the San Bernardino Mountains, extending into the desert like a jetty into the sea and for distances of forty miles



PALM CANYON

An oasis in the desert located at the sterile base of the San Jacinto Mountain. There is a stately procession of these wonderful palms. Various animals visit this canyon to drink from its tepid waters

thermometer registered 120 degrees on the side of the car away from the sun, but we carried overcoats as night on the desert demands warm clothes or, in their absence, a dangerous chilling. Occasional cars were passing through, some being transcontinental tourists preferring the southern route and others coming from oasis settlements farther on. We stopped at shattered buttresses to look for chuckawallas, a brown lizard as large as a young alligator. Our efforts were fruitful and we noted their habit of retreating into deep fissures where they squeezed and flattened into the furthest recesses. But what a spot for an animate form to dwell and thrive! The rocks were so hot that to touch them was painful; the air was of such high temperature that a full breath seemed to burn the lungs. At first sight there seemed to be absolutely no life among these lava blocks, dusted here and there with the drifting sand. Closer examination disclosed feeble plants, growing in the shelter of the crevices. Here was the sustenance of these lizards, and in the spring a feast of desert buds and flowers.

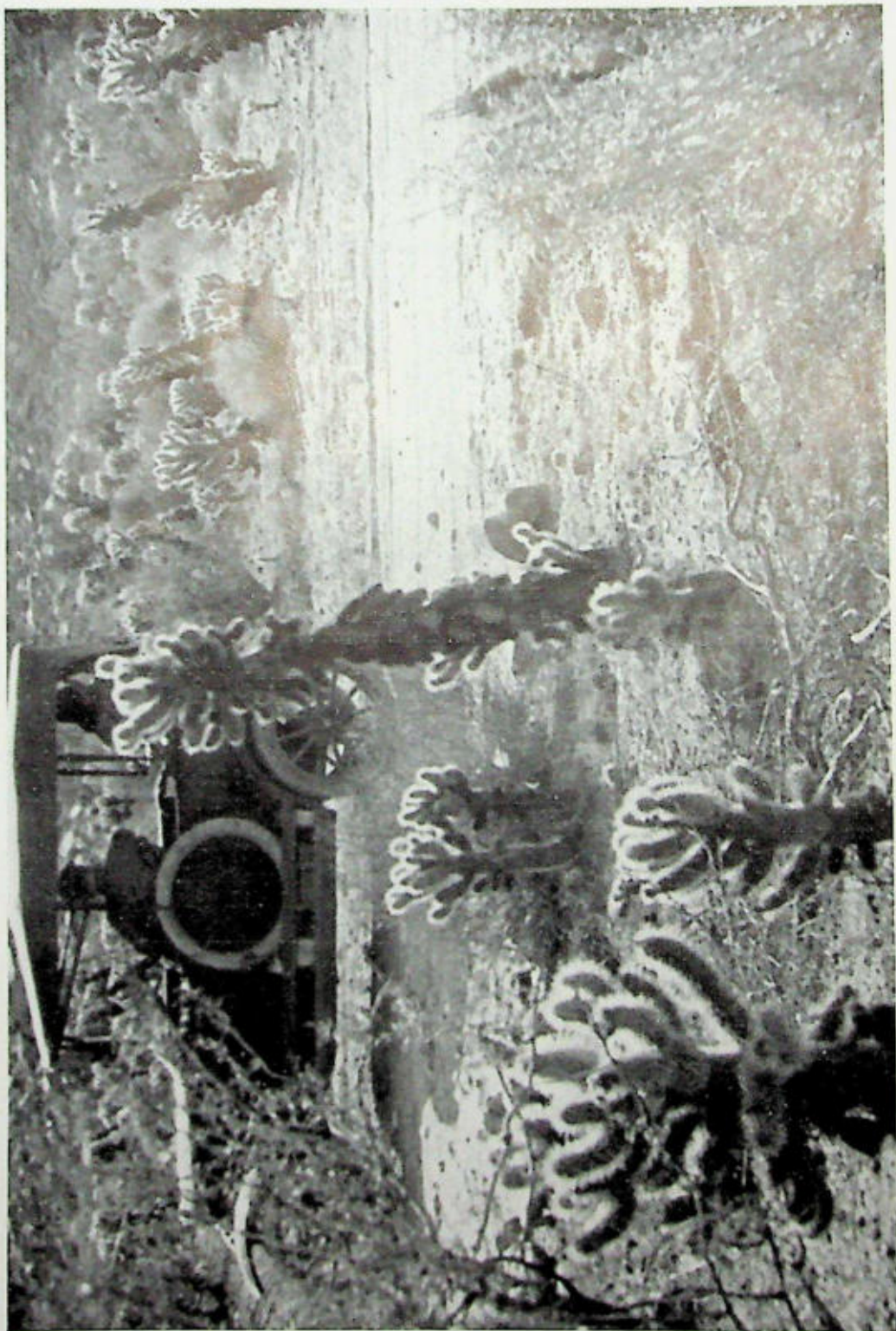
Leaving the forbidding buttresses, we continued straight out into the desert, like a ship leaving port for the open sea. After a half hour's running, we left the cement road and swung to the right upon a fairly hard sand trail

again leading towards the dwindling slopes of San Jacinto. Approaching the tangled rocks, a profusion of cacti of various kinds sprang into view and we bumped through a wide, low canyon called "The Garden of Eden." Here the desert flora is weird and of great interest. Generously distributed among the rocks were the burly stumps of barrel cacti, some of them weighing several hundred pounds. They are fluted like an accordion and with the brief spring rains



TESSELLATED LIZARD

A typical desert form



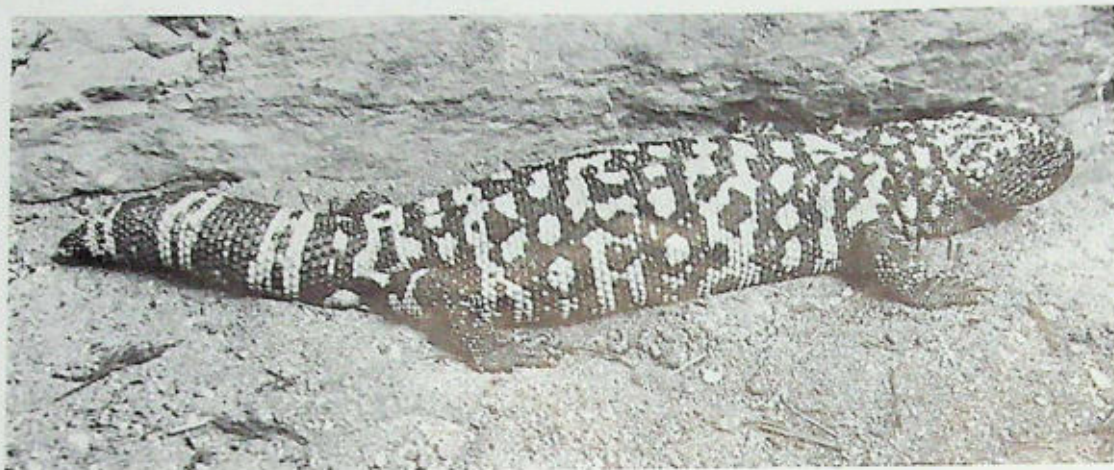
THE "GARDEN OF EDEN"

An area encountered on the way into Palm Canyon. There is a wonderful variety of desert flora



GREASEWOOD AND SAND DRIFTS OF THE MOJAVE

The lower scene of drifted sand is in form like a gigantic snow drift, with sharp, precipitous slopes.
The human figures are a full half mile from the farther edge of the drift



THE GILA MONSTER

This and a closely allied Mexican species are the only known poisonous lizards. The fangs are in the lower jaw

absorb water and swell accordingly. This water serves them the remainder of the year. An active species of lizard—the swift—darted like gray streaks over the rocks.

Our progress continued over the rocks up-grade and into Palm Canyon. Immediately in front rise the formidable slopes of a mountain composed absolutely of shattered rock. The whole picture quivers with ascending heat waves as the car toils up the sterile grade. The car tops a slight rise and an almost unbelievable panorama is flashed into view. A procession of stately palms stretches through the canyon, and placidly murmuring among their broad bases is a stream. These palms are hundreds of years old. How they ever sprang into being in that strange spot is a mystery. Some are date palms.

We noted two-foot masses of hanging dates. Palm Canyon was our destination. Within a minute after arrival the writer stepped on a drab-colored rattlesnake that buzzed angrily and caused us all to jump, then flung itself into a crevice.

There are several species of serpents that thrive in these desert canyons. One of these is the red racer, a whip-like, coral-red creature attaining a length of six feet that wanders out over the open wastes and is extremely difficult to capture. Its speed is like that of an arrow and it has little difficulty in capturing lizards that run so fast they appear like a streak and in stopping seem to utterly disappear. Another serpent of the open is a curious rattlesnake commonly called the Sidewinder. Here is a



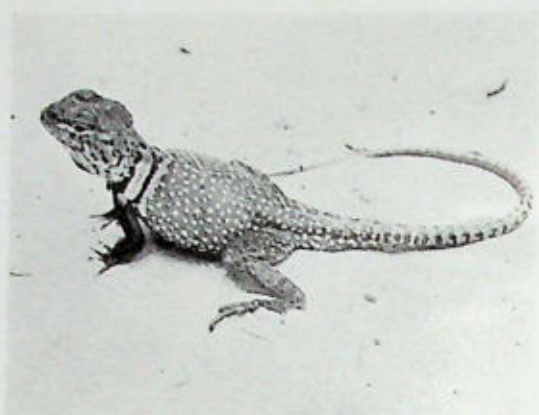
SPINY SWIFT

Exceptionally rapid in movement



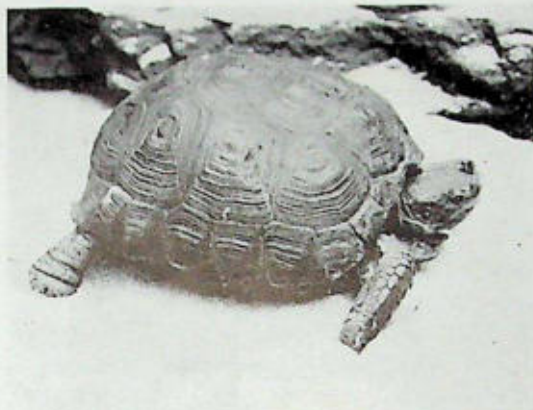
THE SIDEWINDER RATTLESNAKE

One of several species found in the deserts



COLLARED LIZARD

It has a curious habit of running on the hind legs



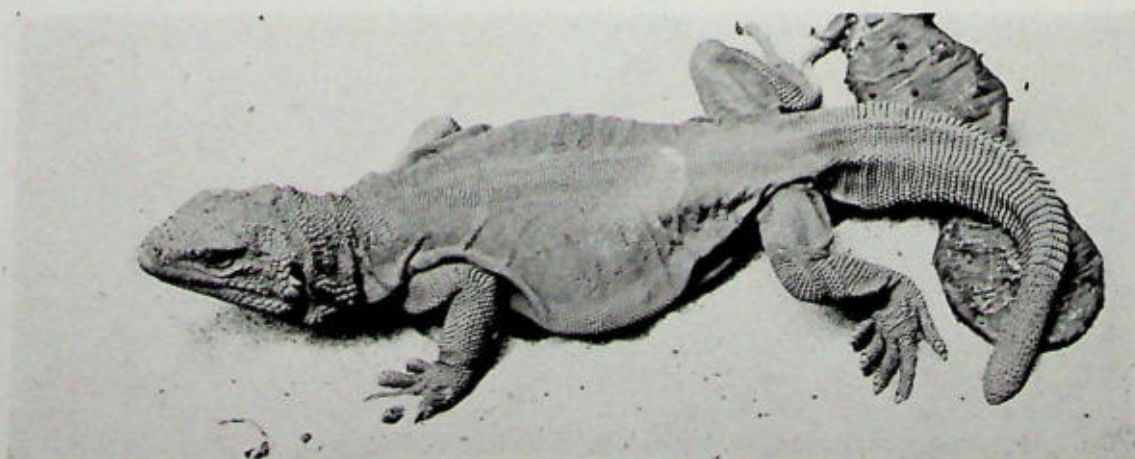
DESERT TORTOISE

Their burrows are excavated in the hard-packed sand

perfect demonstration of the process of evolution in creating a desert type. The hue is pallid, either pinkish, yellowish or pale gray in matching the sand areas over which the species is distributed. This reptile wanders over sand that is often as fine as powdered chalk and as the snake is comparatively heavy-bodied, it would be at great disadvantage in pursuing its prey or escaping from enemies if compelled to crawl like the ordinary rattler, which seldom leaves firmer ground or a near retreat into rocks or heavy clumps of vegetation. The sidewinder is so developed that it flattens the body and by loops thrown rapidly forward in a plane parallel to the ground, literally walks off sideways at an oblique angle to the direction to which the head is pointing. The action is quite astonishing to the observer not familiar with the ways of this snake—being utterly foreign to any anticipated movement attributed to serpents gen-

erally. Rushing off in this fashion to a safe distance the sidewinder further flattens the body until the sides assume the sharpness of a wedge, then by wavy movements it shovels the sand over its back and sinks out of sight. In fifteen seconds' time the snake is imbedded, all but the top of its head, with the short projecting horns, appearing like debris from a cactus. The pale eyes remain uncovered, but match the hue of the sand.

The red rattlesnake (*Crotalus exul*) and the common rattler of the entire Pacific region (*Crotalus oregonus*) are found in the desert canyons. The former wanders towards the open, but not far from clumps of greasewood or sage. The latter prefers the rocks. We found them in the canyons, sleek and fat, four to five feet long and some with a body two inches in diameter. In all this heat, among the sterile sand and rocks, no water in sight nor known to exist in



CHUCKAWALLA

These creatures live among rocks on sterile mountains in the desert and amid intense heat



COLLARED LIZARD

Four positions of the collared lizard photographed while running by Herbert Lang of the American Museum

some of the places where they were observed, no plant life but scattered cacti and forms that appeared as dry as paper, no bird life, nothing but lizards, which they disdain,—we wondered where they obtained the food to keep them so well nourished. This was explained during the trip out of the canyons, towards night.

The sun had dropped behind the San Jacinto range which turned deep purple in the shadow. Across the pass, the end of the San Bernardino range ran forty miles out into the desert like a jetty into the sea and still glowed in the sun in a hue of rose-pink. We were in the shadow of the nearer range and though part of the desert was yet in sunlight, we could look upward and see the brighter stars. Stopping to absorb the wonder of this sudden fusing of day and night we noted that here and there was an emergence of rodent forms. We observed a small species of chipmunk and several kinds of mice. Apparently the rattlers have easy hunting among the smaller, nocturnal mammals.

There is a rather large tortoise that is characteristic of our southwestern deserts. The lizards exist in great variety of form and curious development towards perfect adaptation. One of these is the tessellated lizard, with a beautiful tracery over its back like a miniature mosaic pattern. Along the margins of its toes are rows of flattened spines that prevent it sinking into the sand and enable it to run over the softest places at great speed. Closely allied is the zebra-tailed lizard, the under part of the tail being vividly and broadly barred with black and white—and this species runs with the decorative tail curled over its back. Whether or not it endeavors to bewilder an enemy is a problem, but after running a few yards with the glaring tail erected it stops short, drops the tail and flattens on the sand—and disappears. The illusion is perfect. The body hue of the creature

is such an exact match that with the disappearance of the barred tail the creature seems to have vanished into thin air.

Spiney forms, in keeping with the flora, are also abundant. There are the swifts and the familiar horned "toads." Towards evening the latter burrow into the sand, leaving the top of the head uncovered for observation, but the spiky head decorations are so good a match for the shed spines of the cacti that few eyes ever would focus in their direction. More brilliant forms are the collared and the leopard lizards and the Gila "monster" of the Arizona region. The two former are noteworthy from a curious trait: when alarmed they rear upon the hind feet and run erect for considerable distances. This invites romantic theory. To the east and northeast of their domain is the region of painted rocks, crosian and the graveyards of the great dinosaurs, a number of which lived their ponderous lives in an erect position. The present remnants of reptilian life are the descendants of the Age of Reptiles, existing millions of years ago. Here perhaps, is a trait handed down from the prehistoric giants and adding another phase of interest to our desert reptiles.

A NOVEL DEDICATED TO OUR PRESIDENT

Messrs. Alphonse Lemerre & Co., well known publishers of Paris, are about to issue a novel dedicated to the President of the New York Zoological Society, Prof. Henry Fairfield Osborn.

The theme of the story is a reconstitution of the life of the Cro-Magnon men, and was inspired by Prof. Osborn's "Men of the Old Stone Age."



FRONTAL COURTSHIP DISPLAY OF THE PEACOCK PHEASANT

As the courtship reaches its height the male assumes a frontal position, and increases the arc of spread of the wings and tail until they form a continuous circular fan of ocellated feathers, extending to the very ground on both sides. The hen is affected neither by the aesthetic beauties of this wonderful display, nor the regularity of form or pattern, but apparently by some subconscious reaction to the continued repetition of the courtship performance

hardly noticed—it marks a natural and harmless jungle happening—but a cry of warning, though from a member of an unrelated group of birds, is recognized and acted on without hesitation. I told the babblers what I thought of them and how well they were named, but they had the last word, as usual, and long after I had left the glade I could hear the chorus of triumph and the babble of tongues tearing my character to shreds in the depths of the jungle. And as I turned back toward the river a band of gibbons took up the jubilation, and laughed and jeered high up in the tree-tops. A white Sahib had dared to enter the depths of the jungle, and was now retreating!"

By a turn of the page we travel to the inlands of Borneo. Picture William Beebe com-

pletely concealed at the edge of the display-arena of the Argus pheasant, the first white man as far as any record goes to have witnessed this remarkable courtship, and then this:

"My Argus walked slowly into the arena at five o'clock on this particular afternoon and shook itself thoroughly, fluffing up its body plumage until it seemed twice normal size, then half raising its wings and tail and shaking itself until it fairly staggered on its feet. It then turned and faced the escape trail, whether by intention or not I do not know. Raising its head and neck it gave forth the call—the summons of the loneliest, most solitary pheasant in the world to its equally solitary kind. *Kerwa-a-au* rang out, the last syllable drawn out as the bird lifted itself on tiptoe, putting every effort into the note. The tail drooped



MOUNTAIN HAUNTS OF THE GREEN PEAFOWL IN JAVA

The most picturesque place inhabited by these birds is the mountains of central Java. Never will I forget an early morning when, from the tent door, I looked out across a magnificent gorge to a high, misty waterfall beyond. Small birds of many species had flown from their roosts in small side gorges down to the stream for their early morning drink. At first came the wholly unexpected sight of three Green Peafowl, two with long trains, shooting like meteors across the rainbowed depths. They appeared, glowed like opals in the low-slanted rays, and vanished



JUNGLE HOME OF THE MALAY OCELLATED PHEASANT

In one very deep, narrow gorge a cool rush of air forever siphoned down from the highlands, sighing through the vine-draped limbs of a mighty jungle tree which reared its head high above the shadowed depths. From this place an ocellated pheasant called for six nights in succession, the sound apparently coming from the hillside some distance up the slope, if not from the branches of the great tree itself



GREEN PEAFOWL

At early dawn, before the heavy dew has dried from the foliage of the Malay jungles, the peafowl awaken on their roosts on tall, bare trees, and standing in the first rays of the sun, shake a myriad drops from their plumage. They walk up and down the lofty branches, and half-spread their wings until the great plumes are dry. Then, with a single spring, they leap outward into space and scale down, down to the narrow opening among the trees which becomes a river

an incident which, despite its triviality, or because of it, indicates the wonderful quality of the monograph, perhaps as much as the formal vote of a solemn scientific conclave. Some months ago, upon visiting an up-country dealer of pheasants and game-birds, and bearing in mind the very considerable cost of the volumes, I ventured to ask the man whether he had heard of Beebe's Monograph.

"Heard of it?," he replied, "why I own two sets! I got two boys, you know, and you don't think I'm going to die and have to think of them boys quarreling all their lives as to who owns the Monograph, do you?"

Could praise be more complete?

HENRY FAIRFIELD OSBORN, JR.

March 6th 1923.



TROPICAL RESEARCH STATION
OF THE
ZOOLOGICAL SOCIETY
BRITISH GUIANA



Contribution, Number 123.

PARROT FEATHERS AND PUEBLO
INDIANS

By ELSIE CLEWS PARSONS

THE other night in New York I overheard a hostess give vent to a sense of outrage over a proposed city ordinance against open fires. The lady is one of those fire-lovers who preserves over summer the wood ashes which accumulated during the winter so that the first autumn fire may have a proper bed. At the wineless dinner table, wineless from choice, not from necessity, the guest next to me, who had been chaffing our hostess on her perpetual ashes, gave vent in his turn to a sense of outrage over the best known of constitutional amendments. A few minutes later I happened to mention to my neighbor the hardship upon some of my Indian acquaintances from the law prohibiting the importation of certain kinds of feathers, parrot feathers to these Indian sacerdotalists being as red wine for the eucharist. My fellow guest proved to be an ardent bird-lover, and his passion for bird protection made him utterly indifferent to any considerations of propriety in tribal ceremonial. Truly one man's meat is another's poison.

Among the Pueblo or Town Indians of the Southwest, parrot feathers are used in two ways. They are attached in a small bunch to the crown of the head of dancers, more particularly in the more sacred dances such as the *kok'okshi* or Good Gods of Zuñi, mask or kachina dances for rain, or in certain maskless rain dances by a phallic clown society of the Hopi or by the

Saint's Day dancers in the Rio Grande towns; and in all the towns parrot feathers serve as part of the "dress" of the most sacrosanct of fetiches, the Cornear Mothers.

Dancing in wind or rain is hard on feathers and even the carefully wrapped and rarely exposed feathers of the fetish bundles in time wear out, so that there is a great dearth of parrot feathers today in the dance societies and the curing or weather control societies. To be sure, feathers from other birds may be substituted and even colored to resemble parrot feathers—as grape juice may be substituted in Christian ritual—but this is ceremonial shoddy, extremely distasteful to the Pueblo sacerdotalist to whom ritual sincerity and accuracy are essential for the validity and effectualness of his ceremony.

Now and again a "Mexican parrot" may be seen caged in a Pueblo house, a sorry looking bird, for it is kept merely to be plucked, just as are the eagles which are caged on the house-top or, at Sia, in the plaza, or the turkeys which straggle about town. Eagle and turkey feathers are also important in feather ritual.

Live parrots, however, are rarer than live eagles or turkeys and Mexican trade in parrot feathers has been stopped. What should the Old Men do? Now and again there is in town some White person who is somewhat different from those who go into people's houses without being invited and who are forever taking pictures, and different, too, from the people from Washington who interfere so seriously with life, often without knowing how they are interfering, perhaps not wanting to know. This other kind

of White person wants to know—too much, and so is dangerous and one to be watched. Still, since he already knows something, one can risk asking him for the ceremonial things that are growing so rare—turtle shells, little bells, abalone shells, and, most of all, parrot feathers.

Were it not for the Research Station in British Guiana those reiterated requests for parrot feathers would have had to go unheeded. As it is, thanks to the understanding and sympathetic director of the Station, more than one pious and venerable Old Man has been excessively gratified, and in more than one extremely suspicious and secretive community the work of at least one anthropologist facilitated.

TROPICAL RESEARCH STATION THE WILLIAMS GALAPAGOS EXPEDITION

On March 1st, the Seventh Expedition of the Dept. of Tropical Research of the New York Zoological Society will leave New York. This has been undertaken at the suggestion and through the generosity of Mr. Harrison Williams. He has chartered the 250-foot steam yacht *Noma*, and has asked William Beebe to take charge of the scientific work of the trip.

The plan is to leave New York and proceed with as little delay as possible to the Panama Canal, and on through into the Pacific. Here a course will be laid for the Galapagos Islands, on the equator, 600 miles off the coast of Ecuador.

During the time available, constant dredging and trawling will be carried on, and as careful a study as possible made of the present conditions of the fauna and flora of these mysterious volcanic islands. Among the most interesting forms of life known to inhabit the Galapagos are sea elephants, fur seals, penguins, flightless cormorants, huge marine lizards and giant land tortoises. If reports be true and the tortoises appear to be threatened with immediate extinction from constant inroads by the few inhabitants and ruthless crews of schooners, an attempt will be made to have these islands made into a preserve.

Thanks to the keen interest and generosity of Mr. Williams, a very complete outfit has been assembled for photographing (both stationary and moving pictures) painting, gathering living collections, and preserving material for future study.

The staff will consist of the following persons: Harrison Williams, Patron and in charge of Ichthyology; William Beebe, Director of Scientific Work; Robert McKay, Navigation and

Meteorological Records; James Curtis, Dredging and Diving; William Merriam, Chief Hunter; Harry Hoffman, Marine Artist; Dr. James Mitchell, Physician; Dr. Frobisher, Assistant Physician, and in charge of Reptiles; John Tee-Van, Photography and Supplies; Isabel Cooper, Scientific Artist; Ruth Rose, Records, Catalogues, and Live Collections; Gilbert Broking, Artist and General Preparator; Walter Escherich, Taxidermist.

* * *

On Board S. Y. Noma, March 8, 1923: We are anchored in the harbour of Key West, having just taken on board our physician, Dr. James Mitchell of Washington, who came down and met us here. We have had a slow, rough trip, but every bit of it interesting, and we are now impatient to get to work. Tomorrow we steam to Havana for 90 gallons of alcohol and then direct to Panama.

I have rigged the boatswain's seat low down near the water over the bowsprit and have caught some curious fish and other organisms in the gulf weed which Miss Cooper is now painting. I even shot two interesting birds on board the deck in early morning, and the syrxin of one, a Chuck-wills-widow, is already dissected and drawn. So we are missing no opportunities.

Everyone has fitted in well together and made the best of the weird things which have happened. One very rough night we shipped a solid four feet of water, and were drenched in our berths, but fortunately no harm was done to our instruments or books.

As soon as we leave Havana we shall begin to slow up or stop when anything worth while is sighted, and should be able to collect some good things en route.

This afternoon we caught two shark-sucking fish or remoras from the boat, and this evening I read and discussed the problems of the adaptation of structures to wholly different ends, as the change from the anterior dorsal fin to the sucking disk. By doing this, while the creature under consideration is still alive or has just been killed, the effect is very striking and vivid and arouses and holds interest much more than reading of the things in general which may be seen next week. How I wish you or Gregory could be here so I would not have to give a monologue. I am hoping to get Dr. William Norton Wheeler at Panama.

Signed, (WILLIAM BEEBE).

ITEMS OF INTEREST

An Old-Fashioned Winter.—This has been a winter of record snowfall. To the end of February, the total in snow precipitation was close to seven feet, and March may add materially to the season's precipitation. Temperature changes, as a rule, have not been excessive and on a general average the winter may be considered as moderately cold, with rather short mild "waves" and prolonged periods of tem-



AN OLD FASHIONED WINTER

A view in the Zoological Park looking toward the southwest, made after one of the heavy storms of the past winter

Photograph by Elwin R. Sanborn

peratures at a normal plane below freezing. Abnormal storm conditions have been generally rated in other portions of the United States. Great depths of snow to the northward ushered

in a frequent appearance of wolves in Minnesota, in latitudes considerably south of where they have been reported for many years. Short thaws and the forming of an ice-crust over the

deep snows of the Northwest have caused forest rangers to predict a considerable loss of life among game birds, because of their inability to find food. Despite the type of winter we have passed through, our animals quartered out-of-doors have kept in good health. Many of them, in fact, enjoy the snow. Our attendance has been materially reduced owing to the bad weather conditions affecting roads and walking generally, although powerful motor plows have promptly cleared the Park walks after frequent storms.

Sure Signs of Spring.—Despite the abundant snow, we had a hint on the first day of March of the coming of spring. There is an old cemetery in the West Farms district immediately south of the Park. It encloses an ancient wooden church, and here and there are clumps of tangled lilac bushes and stretches of stone walls that date back to the days before the Civil War. The cemetery forms a little island of undisturbed area, and small serpents have for years lived in the foundations of the deserted church. Big apartment houses around the old cemetery tower above it and shelter it from the winds. Two boys walked through the cemetery and found a number of little brown snakes sunning on the crumbling stone steps of the church and brought them to the Park. Every year about this time the boys of the neighborhood have brought us specimens from this miniature area of country that once was considered remote from New York. The day after the specimens were brought in the temperature dropped well below freezing and the remainder of the little reptile colony had necessarily returned to the hibernating shelters to await another touch of spring among the steadily encroaching buildings and apartments that have already produced a densely populated section in this portion of the Bronx.

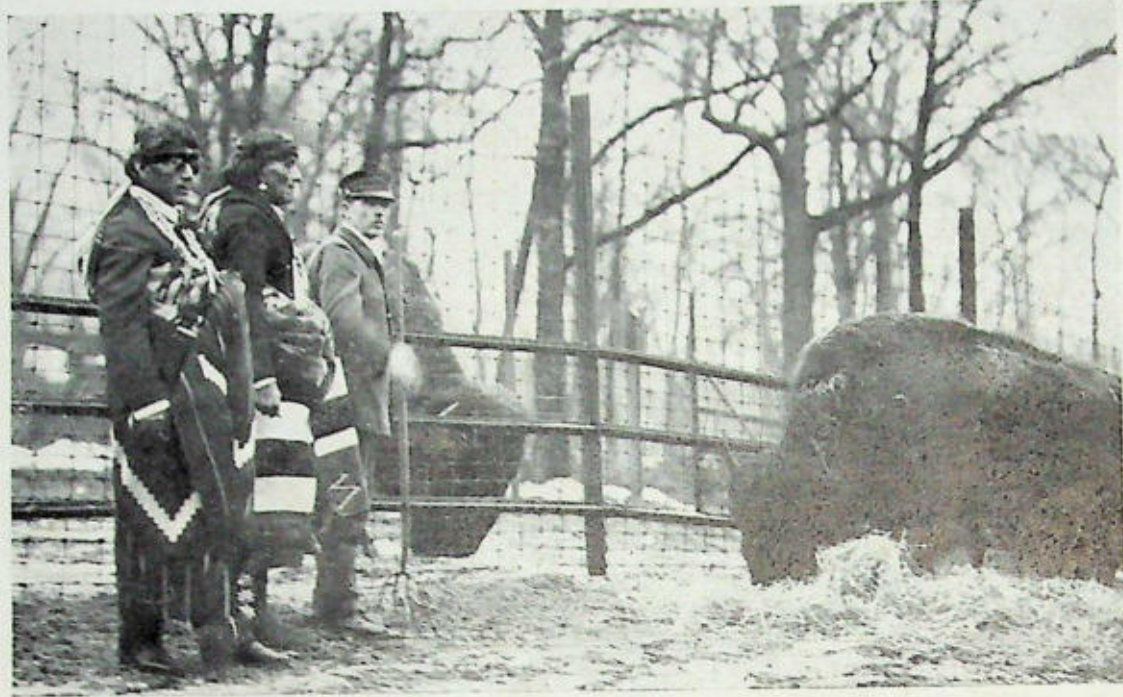
Renovating the Monkey House.—Extensive cage improvements are being made in the Primate House, where we are now exhibiting the best series of monkeys that has been brought together in the history of the Park. The new cagework is designed along lines intended to produce more cheerful lighting and improvements in sanitation. The work covers both inside and outside cages. The health of the collection in this building has been exceptionally good. The series of anthropoid apes is particularly impressive. There are three adult chimpanzees, a male and two female specimens. There is a particularly large male orang-utan, a female that has been on exhibition for a number of years and two thriving youngsters that

are full of play and whose droll antics bring shouts of laughter from visitors.

Scientific Lectures.—The Curator of Reptiles has recently returned from a trip among the western universities and high schools, where a series of scientific lectures was delivered. These lectures related to the habits of mammals and reptiles, and discussion of the economic types, forms of sea life and a simplified discussion of evolution. Judged by the interest elicited, these lectures have been a marked success. They were extensively discussed in the press of the Central West. In preparing a summary of attendance among the audiences at these lectures during a period covering the past five winter seasons, it was shown that the aggregate has exceeded two hundred thousand. Among the larger centers visited were Cornell College (Iowa), Purdue University (Indiana), Principia (Mo.), the University of Michigan and Yale University.

Other Zoological Gardens.—During his western trip the Curator of Reptiles visited a number of zoological gardens and museums, among these being the institutions at Buffalo, Memphis, St. Louis, St. Paul and Ann Arbor. The zoological gardens at Memphis, Tenn., are outgrowing their present site. Under the able management of Wynn J. Cullen, the animals are in splendid condition. Memphis has an interesting series of parks, connected by an extensive drive circling the city. The Park commissioners have about decided to select a site in a park much farther from the center of the city than the one now containing the collection of animals, and rebuild the entire institution to produce the conditions of a true zoological park, with wide ranges and plenty of room for all of the animals. The site is very attractive and close to the undulating course of the picturesque Wolf River. A zoological society was being formed in Memphis with the idea of arousing a great community interest in the enterprise. The zoological gardens at St. Louis are assuming pretentious proportions. The great panoramic bear dens are the center of interest, and there had been a recent appropriation of four hundred thousand dollars for an aquarium and liberal appropriations for other park improvements.

Strange Animal Friendships.—Mr. Cullen, the Director of the Memphis Zoological Gardens, recently told the writer about a curious animal friendship existing in an oddly assorted trio among the collections in his charge. He had reared together three young specimens, consisting of a spider monkey, a skunk and an



ZUNI INDIANS VISIT THE BISON: ZOOLOGICAL PARK

Representatives of the Zuni tribe of Arizona who came east for the opening of the Museum of the American Indian in New York City. During their trip to the Park, the elder man, a high-priest of his tribe, blessed several of the animals. They expressed great pleasure upon receiving two Macaw feathers which they desired for use in some tribal ceremony

otter. These animals were finally given liberty a great part of the day and wandered around the Park, to the great amusement of visitors. So strong was the attachment among the incongruously different types that all kept very close together except at times when the otter decided to swim and dive in a small stream. This produced vociferous anxiety on the part of the monkey watching intently at the water's edge, and a frenzied scampering along the stream by the skunk. The otter seldom took advantage of his aquatic abilities for more than a few minutes and as he emerged, dripping from his swim, the odd trio ambled off to amusements more suited to the other members. We have a similar happy family in the Small Mammal House, although a bit too temperamental to be trusted at liberty in the Park. Its members consist of a sapajou monkey, a coati-mundi and a Mexican fox. They are excellent friends, though etiquette at feeding times is utterly lacking. The monkey is amusingly concerned for his personal interests and when given a lump of sugar he will rush for the water trough, dip it in several times in order to speed its consumption and thus eliminate what might result in a sharing of the morsel with his friends if the process of eating were too prolonged.

Heron Rookery.—For a real touch of Nature, —and existing within the boundaries of the Zoological Park,—we suggest that those among our visitors who are particularly interested in birds, visit the northern part of the Park and study the night heron rookery established by Curator Crandall some years ago. These birds have bred to surprising numbers. Their spectral forms, roosting among the branches of tall trees about the margin of Lake Agassiz, remind the observer of the heron haunts in our southern swamps.

The Collection of Kangaroos.—Over one of our buildings is a lettered carving, "Small Deer House," but this insignia has become misleading. This building now contains one of the finest series of kangaroos and wild swine that ever has been brought together. We are changing the title of the structure and placing signs in the Park directing visitors to this collection. There are thirty-four specimens of kangaroos on exhibition, representing the wallaroo, giant and western red kangaroos, Woodward kangaroo, the black-faced wallaby, ring-tailed wallaby, rufous wallaby and the swamp wallaby. The wild swine are represented by the wild boar, wart-hog, red and South African river hogs and the peccary.

RAYMOND L. DITMARS.



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ZOOLOGICAL SOCIETY BULLETIN

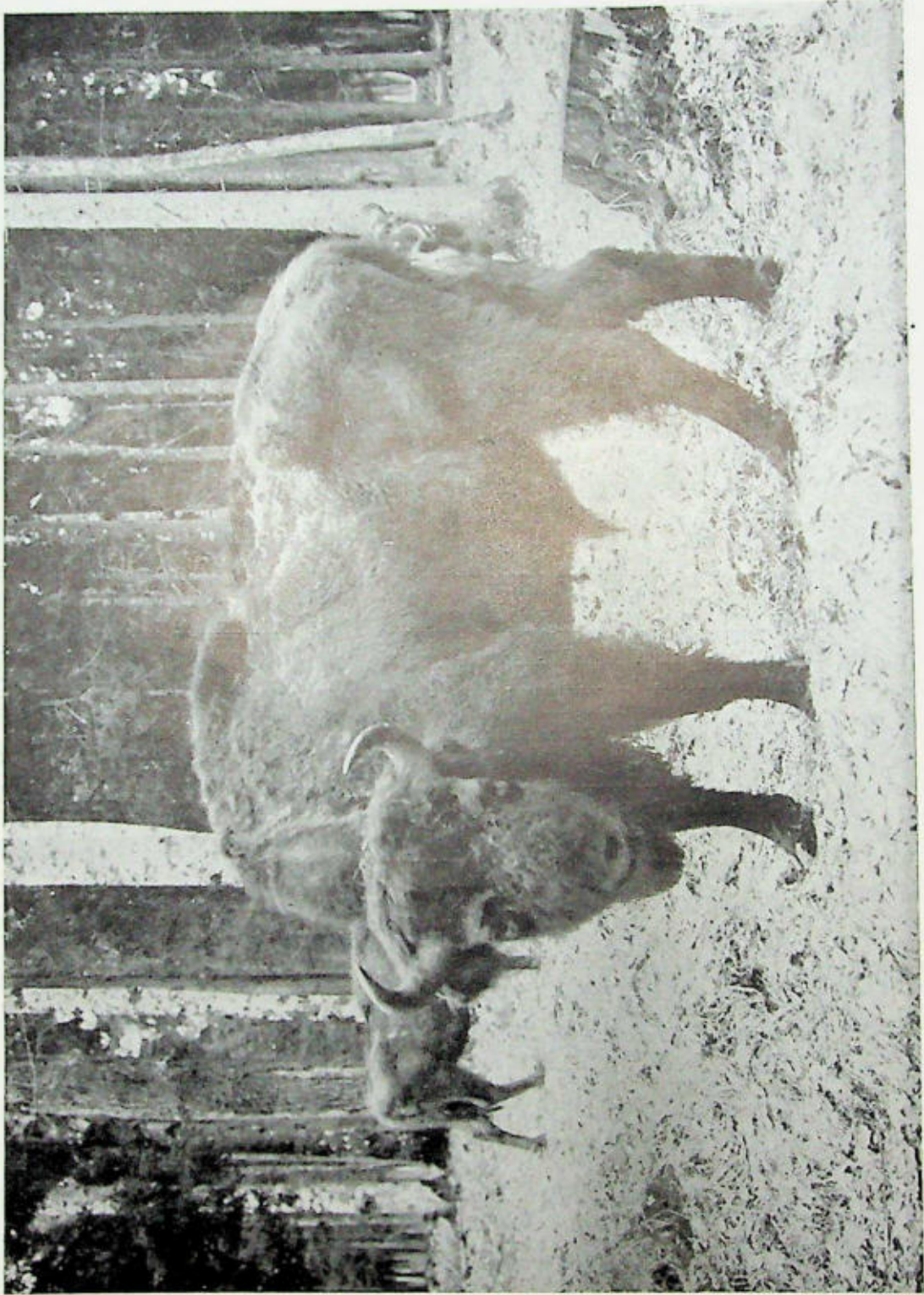
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EUROPEAN BISON BULL
A close-up in the Forest of Blawitseh, Russia.

ZOOLOGICAL SOCIETY BULLETIN

Published by the New York Zoological Society

VOLUME XXVI

MAY, 1923

NUMBER 3

THE EUROPEAN BISON; ITS PRESERVATION OR EXTINCTION

The fate of the largest and once the most conspicuous wild animal of Europe is trembling in the balance. For 30,000 years it has roamed the forests of Europe, but now is on the very verge of extinction. Its present peril is not due to the acts of cave-men or savages, but to persecution by "civilized" man. Only 52 individuals remain; and by good fortune we are able to present three recent photographs of one herd of them, with an article by Dr. Theodore G. Ahrens, author of the bison article published in the BULLETIN of March, 1922. These contributions bring the "Wisent" quite down to date. The question of our cooperation with European zoologists in efforts to save the species depends upon the practicability of the plans finally proposed. W. T. H.

PROPOSALS FOR THE PRESERVATION OF THE EUROPEAN BISON, OR WISENT

Review of a paper by Dr. Kurt Priemel, Director of the Municipal Zoological Garden in Frankfurt, published December 7, 1922, in the "Deutsche Jager Zeitung."

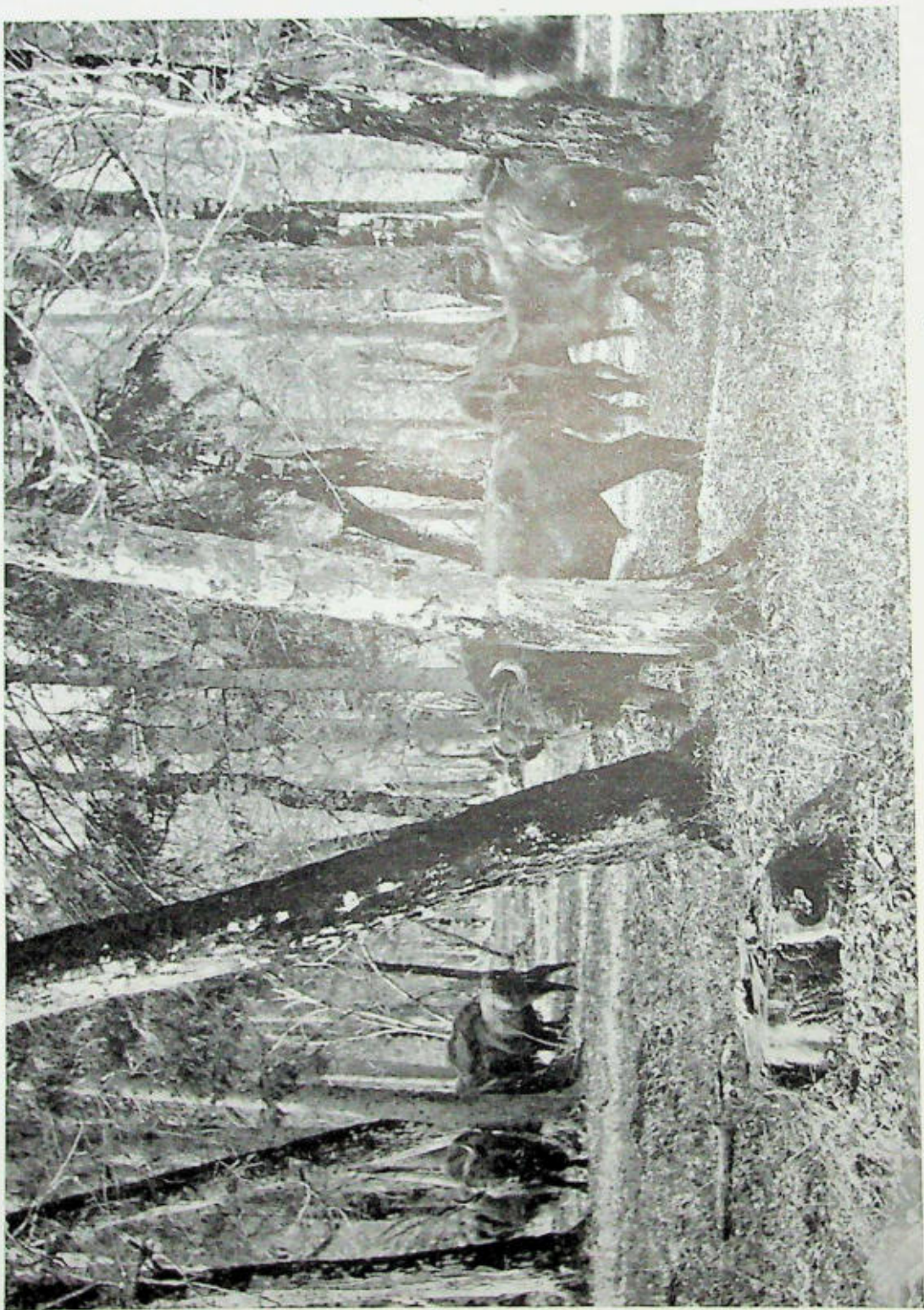
THOSE interested in the fate of the European bison, or wisent (*Bos bonasus* L., *Bison europaeus* Ow.) know that the greatest number of bison (about 700 before the great war) lived in the vast Lithuanian forest of Bjeloviesh, near Grodno, and were rigidly protected by the former Russian government. A smaller number lived in northwestern Caucasia, in the Kuban region, chiefly on preserves of the Grand Duke Sergius Michaelowitsch, who caused them to be protected there.

We have the statement of Professor Matschie of the Berlin Zoological Museum, who does not doubt that besides the above, bison exist in the wooded regions of Persia to the south of the Caspian sea. That author quotes a letter of an artist hunting subjects, Peter Paschen, who states that while he was in Persia and Afghanistan during the war, he frequently saw there freshly killed hides and horns of wisents. He also declares that in Rescht and other places on the Caspian Sea bison meat and hides were frequently offered for sale. The provinces of Gilan and Mesanderen are the principal range of these bison. A critical examination of the skulls of wisents and bisons proves that the Caucasian species, (*Bison caucasicus*) is not a

subspecies of *Bison europaeus* (*Bos bonasus*, but rather an independent species, and nearer related to *Bison americanus* than to *Bison europaeus*. The Persian wisent will in all probability also represent an independent species.

Besides these there were some 60 European bison that have descended from the stock of Bjeloviesh, on the estate of Prince Pless in that part of the Prussian province of Upper Silesia which has been ceded to Poland. On the estates of the late Friedrich von Falz-Fein in Ascania Nova, Southern Russia, there was quite a considerable herd of bison, and the latest reports state that although this territory was again subjected to the disturbances arising from revolution and Bolshevism, about 14 wisents are believed to be still alive there, and may continue to survive if the winters are not too severe. The remainder are to be found in various zoological gardens, not only in Europe, but in non-European countries.

Although the German military authorities did what they could to protect the wisents in Bjeloviesh which survived their advance in the war, upon the withdrawal of the German troops in 1918, practically all the remaining animals, at



THE LAST SURVIVING HERD OF EUROPEAN BISON
In the Binlowitsch game preserve of the late Czar of Russia. Only 52 individuals remain alive in all Europe. Can they save the species from total extinction?

that time about 180 head, were killed; so that the bison must be considered as exterminated there. The author states also that a few wisents have been reported as having escaped from Bjeloviesh, and to be living in the district of Bobrujsk, government of Minsk, some 300 kilometers from Bjeloviesh. The agricultural ministry of the country is said to protect them. However interesting this report is, the matter, even should it be true, will scarcely have much influence upon the present undertaking. About the present conditions in the Caucasus we know practically nothing. The Pless animals have been reduced by poaching to 3 head.

When we sum up, we find about 50 known or available wisents to be still alive, at present widely scattered through zoological gardens or preserves.

The hope, however, must not be abandoned, that if all those interested in the preservation of the wisents can be prevailed upon to systematically cooperate, that species may yet be permanently saved, or at least preserved for many a year to come. In 1916 and 1917, and particularly at a conference of Directors of Zoological Gardens held about that time, the author proposed that the methods so successfully pursued by the American Bison Society could and should be used with certain modifications in an effort to preserve the wisent. Of course, in America the vast territory which could be utilized, the large means available and the stable economic conditions rendered the solution of the problem much easier.

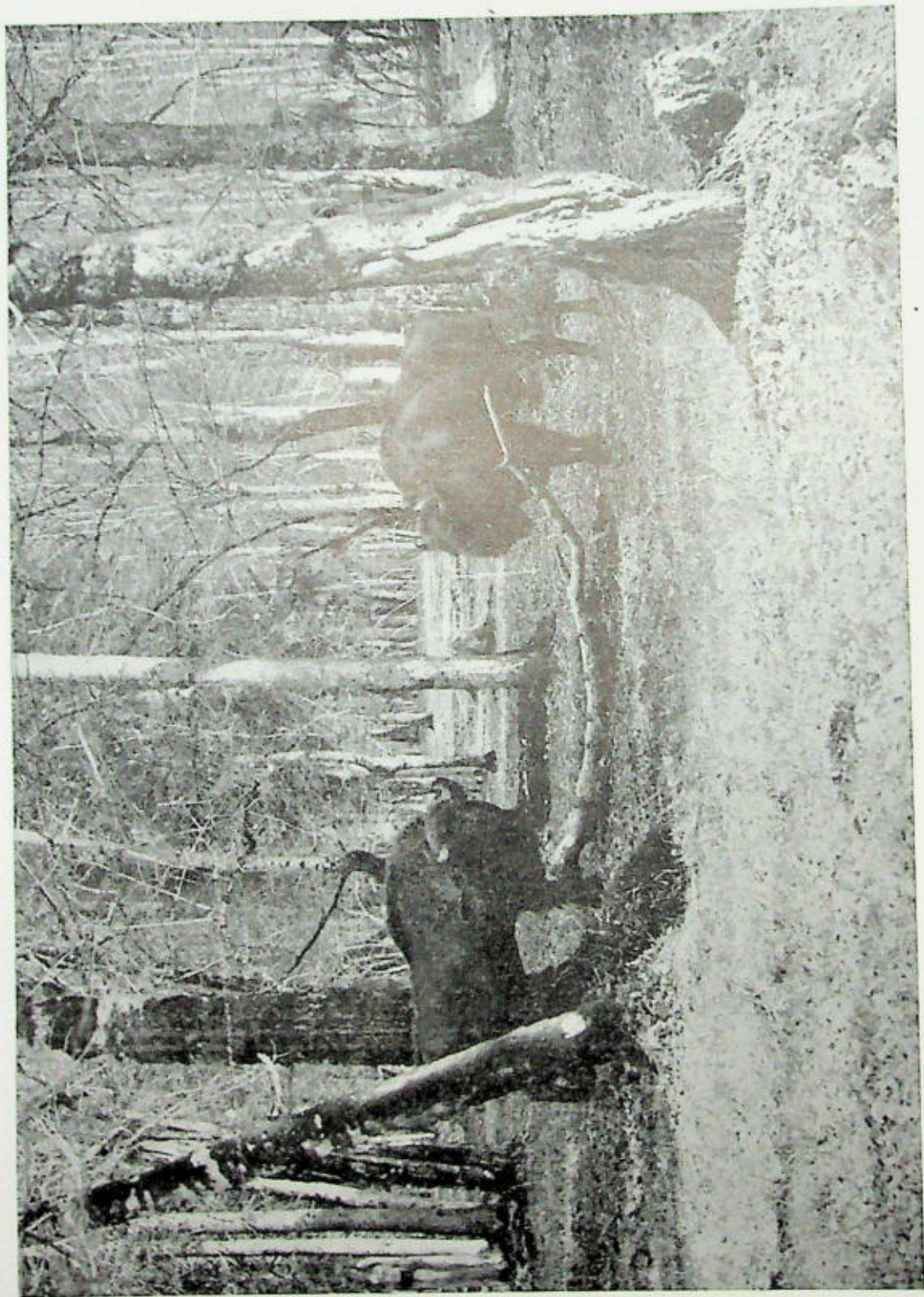
To preserve the wisent, the cooperation of *all* interests, German and foreign, is indispensable, and only thus can systematic breeding be carried out, the necessary funds be raised and the interest of the general public be gained. It is proposed, therefore, to found a "Society for the Preservation of the Wisent," but before a call for members was published, it became necessary to revise all wisent statistics up to date. Questionnaires were therefore sent out, asking information as to numbers and sex, age, derivation, race, physical development, state of health, capacity for breeding, reasons for sterility in sterile specimens, and special characteristics. Most satisfactory detailed replies have been received from practically all domestic and foreign wisent owners. Particularly active aid was rendered by the sons of Carl Hagenbeck, Stellingen, Hamburg; and their scientific assistant, L. Zulkowsky, aided efficaciously in compiling the statistics, and in corresponding with foreign countries. The results of these statistics, which were closed in October 1, 1922, give

a total number of 52 animals,—25 males and 27 females, among which are 5 bull calves, 5 cow calves and 2 sterile cows. Almost all of the animals reported are well developed and healthy specimens.

In connection with these statistics a card-catalogue has been made, where all this information is systematically arranged. Owing to the willingness of wisent owners to cooperate, and to various offers of financial assistance from outsiders, the founding of the proposed society seems assured; and it is hoped that work may be started this winter.

The most important problem for the new society will be to endeavor to increase the number of animals by systematic breeding, and to maintain or possibly to improve the stock by the interchange of individuals from various sources. It should be said here that it is perhaps questionable whether such interchanges will produce satisfactory results, as some zoological authorities look upon such attempts with skepticism. An interchange presents also great difficulties. With one exception, perhaps, all the available stock is derived from the Bjeloviesh herd. This exception is a bull of the Caucasus breed which was presented to Carl Hagenbeck by the Czar in 1907. This bull has always played an important part in reproducing the race, and will continue to do so. There are also descendants of a Frankfort bull, which died some years ago, and which came from the herd of Friedrich von Falz-Fein of Ascania Nova.

Should systematic breeding produce satisfactory results, and the successful experience of zoological gardens tends to encourage this hope, in twelve or fifteen years small herds of wisents may be turned loose in more extensive preserves. In these, naturally the principles of scientific game preservation will be maintained. These future wisent preserves or parks should offer, as far as possible, variegated topography, climate and forest conditions, so that local race variations may eventually develop. A beginning has been made by Count Arnim Boitzenburg of Boitzenburg-Uckermark, province of Brandenburg, who has introduced the Hagenbeck wisent herd upon his estates, and, according to latest reports, also purchased it. It is to be hoped that the dangers of inbreeding may be obviated, and by continuous care, proper food, etc., a healthy development may be assured. Should these efforts fail in part or in whole, as a last resource American bison blood may be introduced, but this last resort would be most undesirable, as an inferior hybrid breed, doomed to eventual extinction, would in all probability be the result.



A PAIR OF EUROPEAN BISON
In the Forest of Bialowitisch, south-western Russia.



DEPARTMENT OF
TROPICAL RESEARCH
OF THE
ZOOLOGICAL SOCIETY



Contribution, Number 135.

THE WILLIAMS GALAPAGOS EXPEDITION

By WILLIAM BEEBE

Photographs by John Tee-Van

I. RÉSUMÉ

THIS expedition, to one of the least visited corners of the earth, was conceived and achieved in record time, every hope was consummated, every expectation realized. First and last, the credit belongs to Harrison Williams, Esq., who initiated and financed the whole trip, and then to the twelve members of my party, who made possible all that we accomplished during the limited time at our disposal.

We left New York on the steam yacht *Noma* on March 1, and returned on May 16. This was just in time to rush the collections of live mammals, birds and reptiles to the Zoological Park, and to frame and hang for exhibition the

one hundred and thirty oil paintings and water colors made during the trip,—in readiness for the Annual Garden Party of the Zoological Society on May 17.

During the trip we steamed a total distance of nine thousand miles, and crossed the equator eight times. Twenty-one memorable days were spent on the Galapagos Islands, and we touched besides at Charleston, Key West, Havana, Colon and Panama.

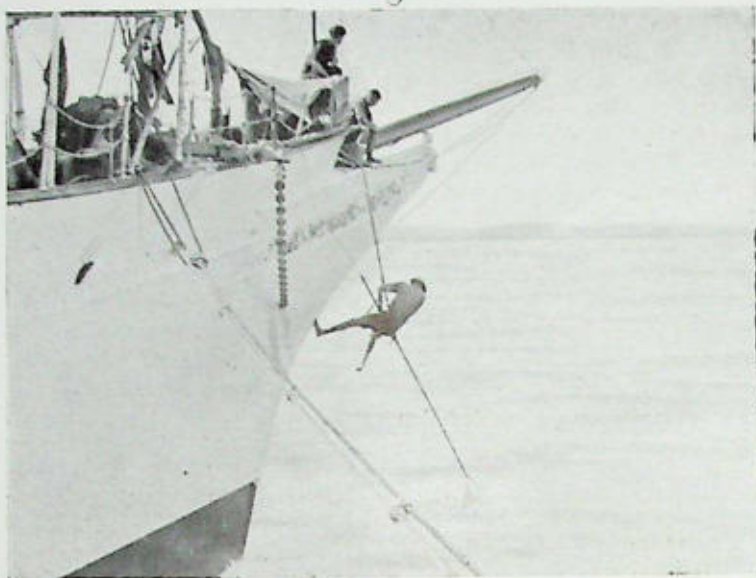
To the living collections of the Zoological Park were added the following, most of which were new to the collections, some being exhibited for the first time anywhere in the world:

Mammals.—5 monkeys, 3 opossums.



THE ISLAND OF INDEFATIGABLE

Twenty-five miles across, reaching an altitude of 2300 feet, with dozens of craters, this island is wholly unexplored except along the coast. Where buccaneers once buried their treasures, wild dogs now roam—waifs from many wrecks.



FISHING FROM A BOWSPRIT

Strange fish, worms, jellies and even insects can be caught from this swinging seat, at full speed and in rough weather.

Birds.—3 penguins, 2 flightless cormorants, 3 gulls, 3 doves, 1 hawk, 10 parakeets, 2 jays, 3 mockingbirds.

Reptiles.—42 lizards.

For the American Museum there was collected material for two lizard groups, including vegetation, rocks, shells, sand and many photographs, together with a giant tortoise, eighteen lizards and a family of sea-lions.

For study by the department of Tropical Research of the Zoological Society:

- 90 water color plates by Miss Cooper.
- 40 oil paintings by Harry Hoffman.
- 46 pen and ink drawings by Mr. Broking.
- 400 photographs and 11,000 feet of moving picture film by Mr. Tee-Van.
- 160 bird skins.
- Many nests and eggs.
- 150 reptiles.
- 200 fish.
- 3,000 insects.
- 40 jars of specimens.
- 60 vials and jars of plankton.
- 200 microscopic slides of plankton.
- 100 specimens of plants.
- 300 pages of narrative, records, notes and catalogues by Miss Rose.

This material is remarkable both for its rarity, excellent preservation and for the fact that it was almost all collected within a period of three weeks. The various groups of organisms

will be studied by members of the expedition or sent to specialists, and the results published in *Zoologica*, while the more general matter will be brought out in a volume the coming autumn by G. P. Putnam's Sons.

II. BRIEF NARRATIVE

The *Noma* with all the members of the Williams Galapagos Expedition, steamed from her berth in Brooklyn at noon on March 1, but swinging the compass and engine adjustment kept us in the lower bay for thirty hours. This gave opportunity for unpacking and storing our vast quantity of paraphernalia, and in fitting up a laboratory, a fortunate interlude as it proved, for

the passage down the coast was rough and stormy. Scientific work on a yacht under way was a new experience to me, and we ran the gamut from comfort to absolute cessation of work. Until we learned to fasten everything down, a sudden terrific wave would sweep the laboratory tables quite clean, and on unusually rough days we would continue our work seated on the floor, as chairs were useless. This was the exception however, and in the usual calm weather, the twenty-five hundred horse-power, twin-screw engines gave forth not a tremor or vibration so that even high power microscopic research could be carried on.

By the time we were off the Florida coast the sea permitted me to occupy my usual perch in a boatswain's seat, over the bow, close to the water, where, with a long-handled net, I secured sufficient fish and sea-weed fauna for days of study. We put into Key West to pick up Dr. James Mitchell and to obtain additional supplies of coal and water, and then crossed to Havana for a supply of 95 per cent. alcohol for the preservation of our specimens. While in port we dredged sand bars, and caught sharks and various tropical fish from the rail.

From the Windward Passage between Cuba and Haiti, to Colon, we were in the trough of a heavy sea, and rolled steadily, occasionally as much as 34 degrees. At Colon we were overhauled and coaled, giving time for collecting

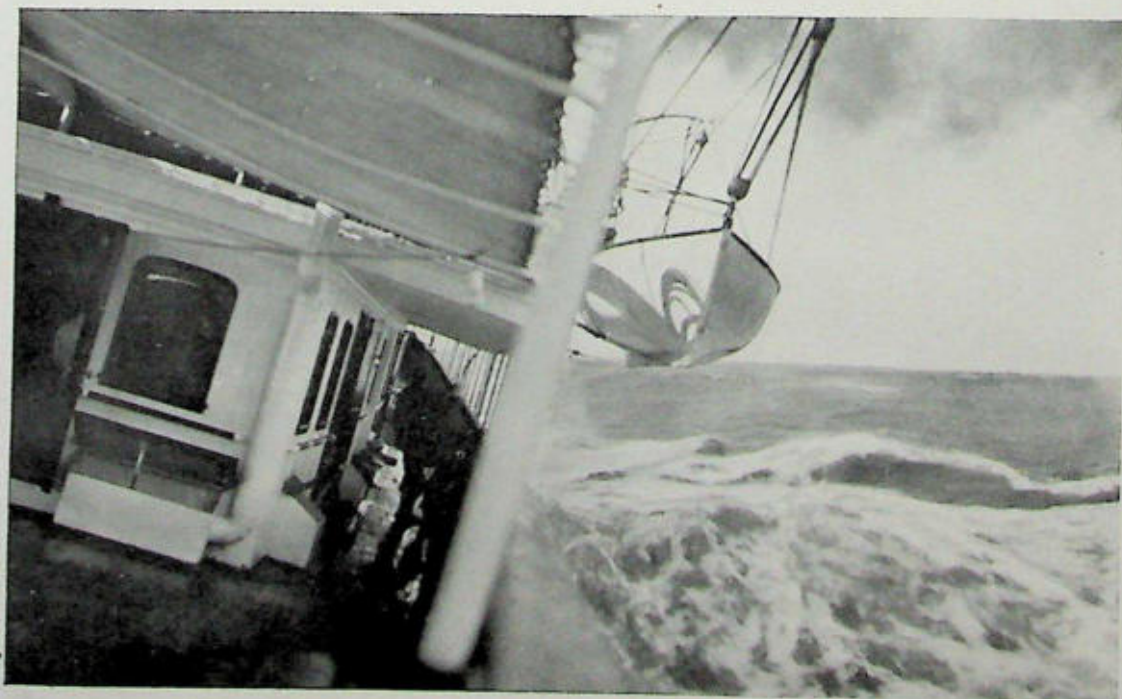
trips to the jungle and coast beyond Fort Sherman, for horseback rides to the Chagres River, tarpon fishing at the Gatun spillway, and trips back and forth across the Isthmus. In Colon we met with the greatest disappointment of the voyage as Mr. Williams was compelled, for business reasons, to return to New York. It was with the deepest regret that we saw him go, for his enthusiasm in the expedition had been great, and now the real excitement of exploration was just ahead.

For a supply of fresh water beyond that which the *Noma* carried, we depended upon the islands, as a supply was marked on the chart in several places, and the pilot book mentioned even a pipeline on the dock at Chatham. We passed through the Canal without special incident, arriving at the Panama end in time to see the final searchlight display of the combined Atlantic and Pacific fleets. On the night of March 24 we steamed into the Pacific, which was as smooth as a lake during the four days it took us to reach the Archipelago. Indeed during our time there and on our voyages to and from Panama this ocean lived up to its name, and we experienced only perfect weather and summer calm, a welcome change from our Atlantic memories.

At dawn on March 28 we sighted the islands,

and steaming slowly among their misty shapes, recognized *Indefatigable*, *James*, *Seymour*, *Daphne*, *Jervis* and *Duncan*, and dropped anchor about 10:00 A. M. in Conway Bay on the north-west side of *Indefatigable*. This anchorage, chosen more or less at hazard because of our incomplete information concerning the islands, proved to be a fortunate choice. Sheltered on the west by *Eden*, an isolated volcanic peak of an island, a sandy beach at the back of a natural lava breakwater provided an easy and safe landing for our small boats. Here we pitched two tents for temporary laboratories, though most of our work in arranging and studying specimens continued to be done on board ship. During our entire stay at the islands we lived on the *Noma*, thus eliminating the extra work of transporting supplies; also we had the benefit of the evening breezes and escaped the mosquitos which on some of the islands appeared at dusk in innumerable swarms.

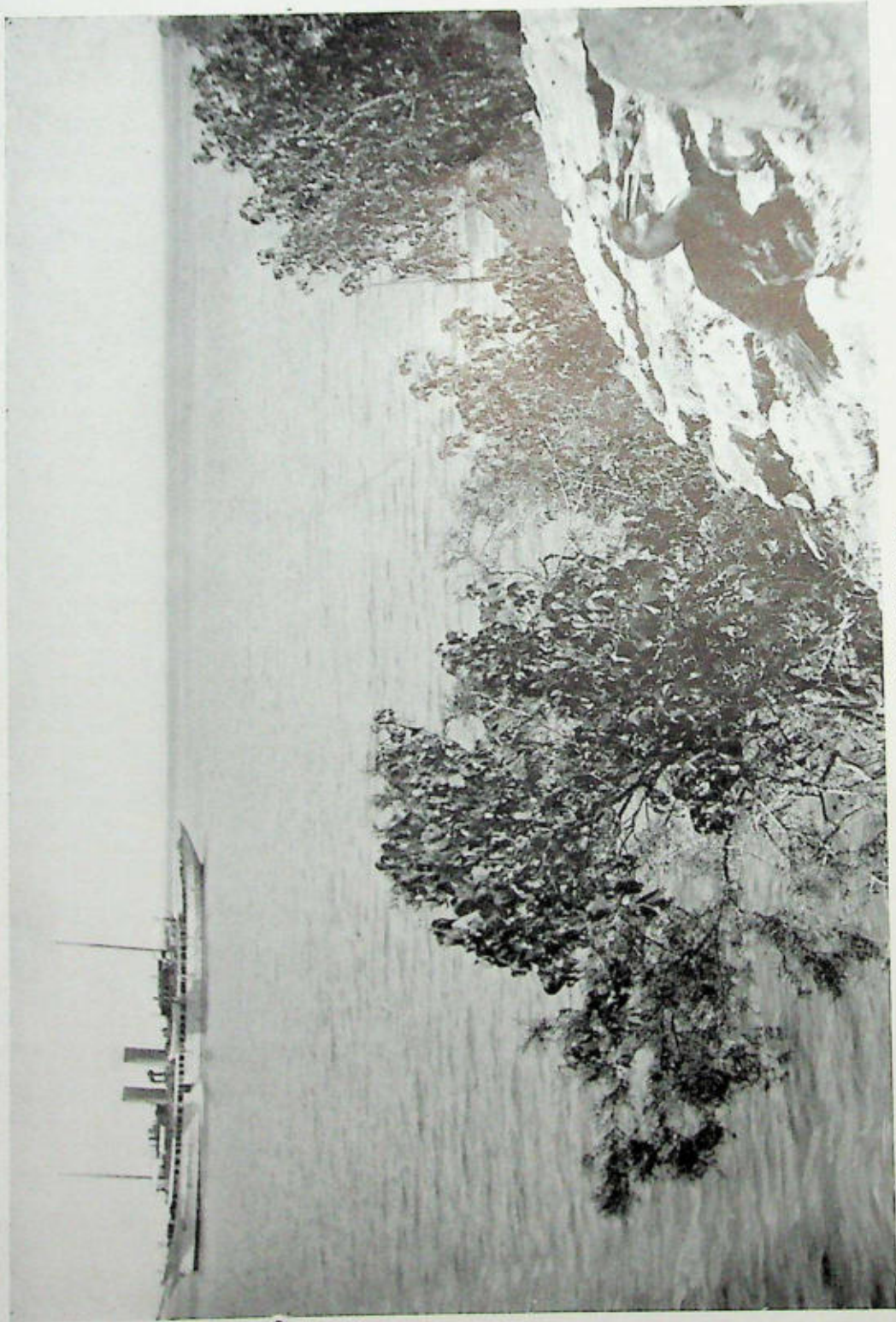
The shore life at this landing, which we named *Harrison Bay*, was plentiful and most interesting. The instantaneously arresting feature was the astounding tameness of all the creatures. Having never seen human beings they had little fear, the birds and sea-lions being particularly indifferent to us. Perhaps indifference is hardly the word, since in many



A ROUGH DAY AT SEA

All work ceased when we rolled in the great troughs. It was a glorious sight to sit in the stern and watch the emerald combers seething over the rail.

Photograph by William Beebe.



TAGUS COVE, ALBEMARLE
The yacht Noma in the haunts of the Flightless Cormorant. The bird sits on its nest without fear, seeing for the first time human beings. This individual is at present living in the Zoological Park.

cases they showed great curiosity about us. Mockingbirds would follow us along, hopping from branch to branch within arm's reach; little flycatchers would perch a foot from our faces, in close inspection of our mystifying presences. It was found almost impossible to alarm some of the big pelicans or gulls and even among the crabs some individuals would stand as quietly as the stone while we touched or pushed them about. During our first hour ashore a wild duck flew down and alighted at our very feet and a short-eared owl perched on my helmet as I walked through the low scrubby undergrowth.

Our first day at Harrison Bay was rich in interest and no one of our succeeding days fell below its high standard. The fact that a large percentage of the fauna and flora of the Galapagos is peculiar to this Archipelago, and the presence of such rare forms as *Amblyrhynchus*, the only marine lizard in the world, and *Conolophus*, an extraordinary land lizard whose numbers are rapidly decreasing, makes the study of these islands of particular interest.

At Conway Bay we had a wide field from which to choose. Eden, in spite of its small size, yielded a great quantity and variety of specimens. It was here in one small cove that I obtained our collection of living *Amblyrhynchus*, and a host of interesting facts concerning their life history. Insects on the Galapagos are very limited as to numbers as well as species, but some unusual ones were collected here, while tide-pools among the lava shore were inexhaustible mines of beauty and value. Guy Fawkes Rocks to the northeast of our anchorage were favorite haunts of sea-lions and many memorable hours were spent under the over-hanging cliffs in photographing these animals and in delightful tests of their tameness. Later, specimens were secured here.

We had not found fresh water at Conway Bay and our supply was rapidly diminishing. Even now we were on rations, shaving in Whiterock or Poland Water and bathing only in salt water. According to the chart, there was fresh water at James Bay on James Island, not far to the north of Indefatigable, and four of the party went off in one of the larger motor-boats to investigate. They returned late the same night, reporting that they had found no water but giving such glowing accounts of the island that we determined to stop there if only for a short time on our way to some other spot in search of water.

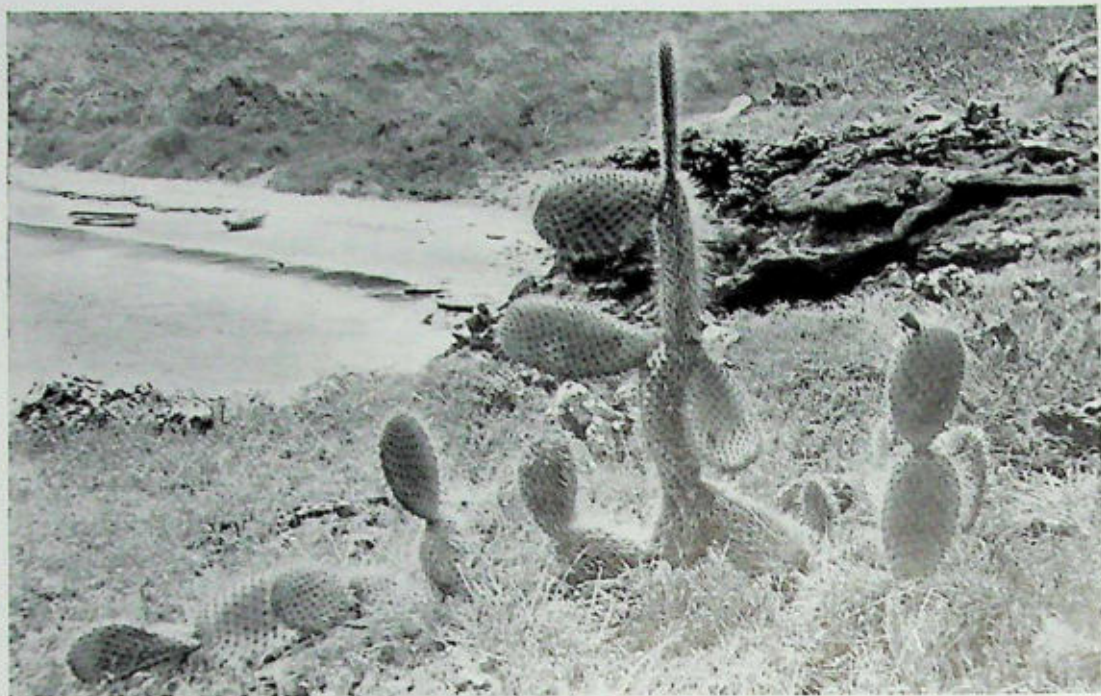
At noon on April 4 we anchored at James Island where eighty-eight years ago Charles

Darwin had spent a week. In James Bay we hurried ashore in small boats. The landing was a difficult one in spite of a long sandy beach, for the surf was very heavy and a bad undertow combined with swirling cross currents made it a risky spot. This island differed from Indefatigable in that trees of a considerable size grew close to the shore, which made it possible with slight effort to reach the forested slopes of the crater. On Indefatigable we had not been able in the limited time at our disposal, to penetrate the miles of country, covered with jagged broken lava, cactus and thorny scrub, which separated the semi-arid coast from the forested high country of the interior. On James the going was also made comparatively easy by the well-defined donkey trails. Each of the larger islands that we visited seemed to have some sort of animal, once domestic, which had bred and multiplied and reverted to a wild state. Indefatigable for instance, has its wild dogs; South Seymour its flocks of wild goats; Albemarle its cattle, and James, judging from the number and well-worn condition of the trails, is the home of large numbers of wild donkeys. Here we also found the skeletons and tracks of wild pig and one of our number shot a large sow. Whether these animals were left here by buccaners or whalers as a future food supply, or whether they are the only survivors of ship-wrecks of long ago, no one knows.

It is an interesting fact that these imported forms, all of which we are accustomed to consider as thoroughly tame, should here, after a few generations of non-domestication, be the only really wild animals. They have reverted to a completely feral state, that is to say, of fear of man, while such creatures as birds or reptiles from which we expect no confidence, are, in these islands, tamer than barnyard fowls. On Indefatigable one glimpse of wild dogs was vouchsafed to me, wolfish looking animals who, on sight, snarled and slunk away.

During our few hours at James Bay we saw only two donkeys, one of which was pure white, though the hills often reverberated to their hearty braying, and the one wild pig was secured only after a stalking as cautious as though a deer had been the object of the chase. The contrast is great between this sort of pursuit and our experiences in lifting up frigate birds and cormorants from their nests, and patting sea-lions on the head.

We found no fresh water on James, only brackish pools close to the sea, where ducks and herons were plentiful. Here too we saw flamingos passing overhead, but there were few sea-



A SANDY COVE IN THE GALAPAGOS

The site of a submerged crater. Out of the crevices of the tortured, dead cinders, spring grotesque cacti, on which perch tamest of mockingbirds, singing their hearts out.

birds, as the closely wooded shores and absence of islets offered no attraction to them. The water question was sufficiently pressing to prevent us from spending more than one day here, and it was decided to steam for Tagus Cove on Albemarle, which was marked on the chart as a good anchorage, with two places on the shore where fresh water could be obtained.

In returning to the *Noma* that evening, three of our party had a narrow escape from what might have been serious injury. In launching the small motor boat, it was overturned by a big breaker and they had a bad few minutes in the surf. Luckily they escaped with nothing worse than a few cuts and bruises. The boat was smashed and rifles and personal belongings were lost. Later in the evening when their predicament was discovered they were brought off in a lifeboat.

Early next morning we left for Tagus Cove, steaming around the north end of Albemarle and passing between it and Narborough. On these two islands we saw what seemed like the most recent evidences of volcanic activity, great black swathes of lava slashing across the green of trees and undergrowth. It became noticeably colder in passing to the west of Albemarle on the open ocean side, so much so that sweaters

were comfortable for an hour or two. During our stay this effect of the Humboldt Current was noticed only in the extreme south of the Archipelago. At first we were doubtful of the identity of Tagus Cove, it seemed so small and unlike in shape to that anchorage shown on the chart. But once inside, a more perfect shelter would be hard to conceive. Long and narrow, between straight towering cliffs, with deep water up to within a few feet of land, it was a satisfactory and a wonderfully picturesque anchorage. The landing facilities left much to be desired, but that was of small moment compared to our disappointment when the chart was once more proved to be over-optimistic on the subject of water. Not a drop of the precious fluid was to be found, although this was the height of the rainy season, and our only hope now was to go to Chatham, in search of that pipeline of which the pilot book spoke so glibly.

We calculated that with our shortage of supplies it would not be advisable to stay long at Tagus Cove, but our few hours there yielded a rich harvest. Some of the party explored the slopes adjacent to the Cove, finding quantities of nests and eggs of the black finches (*Geospiza*), and other indigenous birds, besides insects, lizards and botanical specimens. Others

climbed the steep cliffs around the Cove, carrying with them by enormous exertion, motion-picture and other cameras, plates and equipment up the almost perpendicular slopes. In this Cove we secured alive penguins and flightless cormorants, as well as the nests and eggs of the latter. Boobies, pelicans and terns were abundant and nesting.

We left Tagus and steamed toward Chatham, crossing the equator four times in twenty-six hours. Early the next morning we anchored at Wreck Bay which boasts the only lighthouse in the Archipelago, visible for four miles, which is not bad for a gasoline light on a long pole. Nothing else is to be seen of human occupancy in this Bay except a square white shack where the lighthouse keeper lives, and a very shaky pier. The Pipeline of the pilot book did not exist. The lighthouse keeper, an Ecuadorian who said he was also Captain of the Port, came aboard with an old Englishman, and we were told that the only way to obtain fresh water was to have it brought in casks on the back of oxen from a distance of five miles up in the mountains. As we needed forty tons of water, this was an impossible way of obtaining it, and the prospect was very gloomy. The old Englishman who told us he was "Johnson of London"

and who had lived so long in Wreck Bay that he had almost forgotten his native tongue, volunteered to pilot us around the island to Fresh Water Bay where he was sure we could get a sufficient supply. So having stopped hardly long enough to anchor, we got under way again, and cruised around to the Bay with the promising name.

Here we found two cascades of fresh water, one of good size, which plunged over high cliffs and poured into the sea. Against the foot of the cliffs surged a tremendous surf, which kept all small boats a hundred feet off shore. The Bay was such only by courtesy, for there was almost no incurve to the forbidding coast line and it was on the weather side of the island. There was no bottom a quarter mile off shore, and the Captain dared approach no closer. So we watched the tantalizing spectacle of quantities of fresh water running to waste in a spot which for us was utterly inaccessible.

However, with three others I made an attempt upon a bit of low pebbly beach with a mass of green back of it. I leaped overboard and let the roller wash me up on the piled pebbles, and there, immediately behind, was a broad stream of pure water rushing down into the sea. We rigged up the long rubber deck hose, one end



THE LAVA SLOPES OF EDEN

Home of the great sea lizards. At low tide they clamber down over the barren cliffs to feed on tufts of seaweed. Indefatigable in the distance.



SEYMOUR ISLAND

Where hawks are so tame that one may walk around them and choose a suitable background.



LAND LIZARDS OF THE GALAPAGOS

On the sandy upland veldt of Seymour Island we caught these great iguanas, red and green, yellow and ivory white,—as eager to bite as their fellows of the surf were innocuous.

being in a lifeboat a hundred feet from shore, and the other on top of the pebbly beach. This end I held as high as possible in the air, while the rest poured buckets of water into a funnel. In an hour we had four tons of sweet water in the life-boat, and we towed this off to the yacht. There we found that, unable to anchor, we were consuming coal at a rate which would still further curtail our stay. So we had to give up our hard-earned plan of filling the tanks on the next morning.

After landing "Johnson of London" who had given us so little in return for the enormous quantities of food and cocktails which he had consumed, we steamed back to Conway Bay for a last clean-up of the specimens which we needed. Then on to Panama which we reached on the last ton of coal in the bunkers and the last gallon of fresh water.

At Panama we added to our party Prof. William

Morton Wheeler of the Bussey Institute, Harvard, who had been with me at Kartabo in British Guiana, and whose philosophical grasp of evolution and life on the earth makes his presence on any expedition a tremendous asset and pleasure. We coaled again, covering the lower decks with great sacks and besides laid in quantities of bottled water.

When we again sighted the Galapagos it was decided to try another anchorage near Indefatigable, farther to the east, in the shelter formed by the two Seymour Islands. During the first day ashore two attempts were made to penetrate to the crater, but both were defeated by the terrific going. We realized that two or three camps must be established to accomplish this feat, and in the limited time which we had, it seemed infinitely wiser to concentrate on the vast mass of material ready to hand along the shore, rather than give up precious days to the mere performing of a stunt.



A FEARLESS SEA-LION

Like the birds in the background, this big male seal had never seen a human being, and could conceive no harm as coming from such a strange creature.



DARWIN BAY, TOWER ISLAND

A sheltered, mile-wide bay which seems never to have been described or mapped. Every niche of cliff, every bush or shrub holds nests of gulls, terns, boobies, doves and frigate-birds.

Here we again found the small islands in the vicinity to be far more interesting than the large one. South Seymour, to the east, was geographically quite unlike any other island, as back from the shore it consisted of open veldt-like country. This was covered with grass and dotted sparsely with cactus and fair-sized trees, where moving flocks of spiral-horned goats took the place of antelope in corresponding places in Africa. This too, was the only place where we found *Conolophus*, the giant land lizards.

Dahpne Major, five miles to the north, was visited twice. It is a perfect island crater, and after landing on its most inhospitable cliffs, we climbed its precipitous sides covered with loose, easily-sliding shale and looked down into the deep crater. The floor covered with white sand was dotted everywhere with hundreds of nesting boobies, all of the blue-footed species. We went down and walked about among them, collecting a chick, or an egg or an adult here and there, and taking photographs at close range without causing more disturbance among them than an occasional gurgling protest. Except for one dead pelican we saw no other kind of sea-bird on the floor of the crater, though on the outside slopes were numbers of nesting tropic-birds, terns, *Creagrus* and Galapagos gulls.

In all our wanderings we had seen no tortoise nor traces of one anywhere, although not so many years ago they were probably the most usual sight on the islands. The whaling ships used to carry them away by the hundred to provide a welcome change of diet on long voyages. Oil hunters from the mainland have made great inroads on their numbers and wild dogs and pigs have probably accounted for numberless eggs and newly-hatched young. Where the tortoises are not actually extinct, the survivors have evidently betaken themselves to the craters of the interior. In 1907 it was reported that these reptiles were most numerous on Duncan, so five members of the expedition went to Duncan in a large motor boat, thirty-six miles away, hoping to verify this report. They beat over the land near the shore and much of the interior of the lesser crater and found only one moderately large tortoise, which, after the most exhausting labor, they managed to carry back to the boat. It seems certain that another unique form of life is well on the road to extinction, thanks to the efforts of man.

Our last anchorage in the Archipelago was at Tower Island, in Darwin Bay, a hitherto unmapped bay which we discovered and named. The bay is over a mile square, with deep water

New York Zoological Society



OBJECTS OF THE SOCIETY

☐ A PUBLIC ZOOLOGICAL PARK. ☐ A PUBLIC AQUARIUM. ☐ THE PRESERVATION OF OUR NATIVE ANIMALS. ☐ THE PROMOTION OF ZOOLOGY.

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WILLIAM BEERE, <i>Honorary Curator, Birds</i>	

Each author is responsible for the scientific accuracy and the proof reading of his contribution.

VOL. XXVI

MAY, 1923

No. 3

We think it vitally necessary that the taking of surplus protected animals should, everywhere and at all times, be accompanied by strict legal limitations as to the precise number that may be taken each year. We think that the opening up of a protected species, even for ten days, to free trapping or killing by every citizen who chooses to ask for a permit, is wrong, and in most cases certain to prove disastrous. The killing of wild game mammals or birds, or of fur-bearing animals that by long immunity from slaughter have become fearless and tame, is a delicate and dangerous proceeding. If not held down to fixed lines by iron-clad regulations the result is—unjustifiable slaughter!

I think that the only way to regulate it is by fixing in advance the maximum number that may be taken, and enforcing the limitation.

The New York State Conservation Commission is now convinced that the time has arrived wherein it is necessary to take toll of the beaver population of the Adirondacks. In response to an inquiry for information, Chief Game Protector Llewellyn Legge wrote me on May 10, as follows:

"As to the beaver, the Department made a careful survey of the beaver and found they were doing a great amount of damage in the Adirondack Mountains, and quite some damage in the Catskill park region, and have from time to time issued permits to persons to kill beaver where they were doing damage to private property. These permits provide that the pelts must be sent to the Conservation Commission. Of course, we realize there were some beaver trapped illegally, but even with that drain it did not keep the number down, as they continued to increase and the property damaged was increasing very rapidly, so this year the Commission favored a bill which was before the Legislature making an open season on beaver during the month of March, said bill giving the commission the right to designate in what Counties beaver could be taken.

"As I have stated, through our Forestry Department, we know the areas in the mountains where the greatest damage is being done, so that is the place probably where the licenses will be effective to take beaver. With the law as it is now, if there is any danger of extermination of the beaver because of their having an open season of four weeks in March, the Commission has the authority, without any legislative action, to prohibit the taking of beaver for a period of time at the expiration of which it would automatically open again, and then the same action could be taken in closing under the statute, so that with the present law providing for four weeks open season, the control of the whole matter is placed in the hands of the Commission. The four weeks ought to take care of the surplus beaver, and as I have stated; and if there is too great an extermination, the Commission can control it under the statute." W. T. H.

MEMBERSHIP OF THE SOCIETY

The following persons were elected members of the Society, March and April, 1923, by the Executive Committee:

MARCH, 1923

ANNUAL

Cecil Barret	Mrs. Arthur Butler Graham
Mrs. Cecil Clark Davis	Mrs. Harry C. Hand
Benjamin H. Doane	Miss M. Helen Hicks
	Mrs. Charles H. Higgins

APRIL, 1923

LIFE

S. Prentiss Baldwin	Robert Woods Bliss
---------------------	--------------------

ANNUAL

John W. Cutler	Warner Dayton Orvis
	Mrs. Warner Dayton Orvis



Building the structure of wood upon which the mold for the bronze will be made.



Mr. Harvey at work on the enlarged model in preparation for the bronze casting.

Photographs by Mrs. Eli Harvey

"A BRONZE BRUNO FOR BROWN"

A BROWN-BEAR STATUE FOR BROWN UNIVERSITY

"Ivan," the great Alaskan Bear of the Zoological Park, to be cast in Imperishable Bronze

By HERBERT B. KEEN (1907)*

Chairman of the "Bronze Bruno" Committee.

THIS idea of a bronze bear has appealed so strongly to so many graduates that it was recognized in June, 1922, that some class was bound to make this gift sooner or later. So now we of the committee believe that the best way to do this inevitable thing is for all Brown men to make the gift together.

The plan for a bronze bear for the grounds of Brown University was set going at Commencement, 1922, and about \$800 in gifts and pledges were collected then, as related in the *Brown Alumni Monthly* for July. Since that time a general committee and an executive committee have been formed to see this project through.

*Quoted matter—*Providence Journal*.

The names of several sculptors were considered by the committee, and after duly weighing the special requirements for this piece of work, Eli Harvey, the well-known animal sculptor of New York City, received the unanimous vote of the committee.

Mr. Harvey is a native American who made a serious study of animals under the distinguished French sculptor Fremiet for a period of ten years. In France his work was exhibited in the Paris salons from 1894 to 1901 and in the Paris Centennial Exposition of 1900. His animal sculptures have been exhibited at the American Expositions of Buffalo, St. Louis, Portland, Oregon and San Francisco.

He is represented in sculpture in the permanent collections of the Metropolitan Museum of Art, New York City; the St. Louis Art Museum, the Cincinnati Art Museum and the Newark Library and Art Association.

One of Mr. Harvey's most important and spectacular commissions was for the four life size lions in marble that guard the doors of



THE MODEL RESTING

Mr. Harvey experienced considerable difficulty in persuading "Ivan" to pose. Numerous varieties of food were tried to induce him to stand for periods long enough for the sculptor to catch the necessary action. His wistful expression in the photograph plainly indicates that he expects as much for a sitting pose as one standing. However, "Ivan" was a capable model, and also what a Brown man would appreciate with delight—a "good fellow" as well.

Photograph by Elwin R. Sanborn

the Lion House of the Zoological Park, the two pediment groups, and the lion heads on the wall of that building. These were executed in 1900. Other commissions were an American elk for the B.P.O.E.; a pair of lions for Toronto, Canada, and the eagles on a facade of the Victory Arch, New York City.

Mr. Harvey was selected by the American Numismatic Society to design a medal portraying the American bald eagle, as the national emblem, to commemorate America's entrance into the World War.

The bear has been Brown's mascot, celebrated in song and story for years, and a bear in the grounds will be an inspiration to the undergraduates as an actual totem for the expression of their college spirit in the four years when college spirit is most alive.

It has often been said that most gifts to colleges take little if any note of the eternal spirit of youth which makes its home on a college campus. We believe a magnificent bronze bear will be an inspiring



SCULPTOR IN THE ZOOLOGICAL PARK

Mr. Harvey constructed his model for the "Bronze Bruno" with great difficulty and immense application; seizing upon every fleeting movement of Ivan to build up the working figure. As the bear was inclined to take it easy, the sculptor was obliged to work out the figure bit by bit until it was completed.

From Motion Picture Films by Elwin R. Sanborn

thing for our college youth and will help to arouse and strengthen those fighting qualities which we want our boys to have and which will go far to make them invincible in athletics, as well as in life.

We are sure that the artistic Bronze Bear we are going to set up will be a centre for undergraduate gatherings. Songs and poems will grow from this theme, and tradition will make of this spot a rallying ground for all those customs and celebrations which bring Brown undergraduates closely together.

The bear has already been pictured on our programs and posters and in our college publications, and "Brown Bear Bonds" raised the money for our Endowment and Development Fund. Since the newspapers commonly refer to the Brown teams as the "Bears," is it not time to set up a model of a real bear in our grounds? "Eli Harvey's model of Ivan," the great brown bear in the New York Zoological Park, has been accepted by the committee. Mr. Harvey is now putting the final touches on it so that the Gorham Company may cast it in this city (Providence) some time in May.

The figure stands practically nine feet high. It will be mounted on a Rhode Island boulder which will have imbedded in it a

piece of the original rock on which Roger Williams first set foot when he landed on the shores of the Skeeckonk. Theodore Francis Green of the Brown class of 1887 and the originator of the idea of the bear as a mascot for Brown, has given this piece of rock to the committee. The total height of the statue, with pedestal, will be approximately fifteen feet.

"The site for this gift has not yet been definitely decided. Several prospective sites were recently inspected when Herbert B. Keen, 1907, chairman of the general committee, and Arthur W. Pinkham, 1902, were on College Hill, but a final selection has not yet been made. It is probable, however, that Bruno will stand on the middle campus, where he will be a rallying point for all Brunonians, and for Brown celebrations.

"The estimate for modelling, casting and

erecting the statue is approximately \$10,000. Half of this amount has already been pledged or actually paid in.

"A campaign of publicity to consist of magazine articles, posters and letters was outlined by the committee, and it was voted to allow the undergraduates at Brown to share in the pleasure of setting up our bronze bear, but no undergraduate will be allowed to give more than one dollar, the subscription price of one "hair."

"Put a patch of hair on the bear!" is the slogan animating the committee. Several hundred Brown men have already done so. Graduates from other colleges—Yale for one—have even sent in contributions; and Henry G. Clark, treasurer of the committee, said yesterday that he had received one dollar "for a hair" from a boy who expects to enter Brown in the class of 1929."



NORTH AMERICA'S ONLY STORK

The name Wood Ibis is a misnomer. It is called a Wood Ibis because of its resemblance to the birds of that group.

STORKS IN THE ZOOLOGICAL PARK

By LEE S. CRANDALL

Photographs by ELWIN R. SANBORN

FEW birds appear more often in myth and legend than the stork. The species that figures most commonly is the white stork, a bird whose range extends over all of Europe, and a large part of Asia. Thus it has been associated with man from the very beginning and its use in folk-lore has become traditional. The bird is still venerated in Europe and in some countries, particularly in Holland and portions

of Germany, has become as nearly domesticated as is possible for a migratory species. Pairs of stately storks are a common sight about the fields, dozing in stationary grace, with one long leg drawn up, or stalking with stately stride the frogs and mice which form their food. Wagon wheels or rough platforms are placed on the peaks of buildings and here the storks build their nests and rear their young, the same pair occupying a favorite site for many years in succession.

Unfortunately, in many parts of Holland, the white stork is becoming very much reduced in



THE LARGEST OF THE AMERICAN STORKS

The jabiru vies with the marabou stork for the distinction of being the most grotesque of birds. The stony face of the sphinx is no more inscrutable than the solemn visage of the jabiru as he stands in a pensive attitude of meditation.

numbers and many nests in use for years without number are now tenantless. Some authorities attribute the loss to poisoned locusts, eaten by the birds in their South African winter range, others feel that it is due simply to the drainage of old marshes which harbored suitable food for the summer months. At any rate, if this picturesque feature of Dutch fields is to disappear, its absence will be keenly felt.

In storks, as in swans, where the traditional color is white, it is strange to find a color anti-thesis. But as there is a black swan in contrast to the snowy bird of old, so is there a black stork to upset our well established idea of what a stork should be. The black stork breeds in Germany, and perhaps in Spain, ranging eastward over Asia. It is smaller and much more shy than the white bird and avoids the haunts of men. Scarce in Europe, it is said to be fairly abundant in portions of Asia. The species has not been represented in the Zoological Park since 1914—one of the many war-gaps which time has not yet filled.

Once accustomed to the fact that the conventional stork is not alone in the world, we are not surprised to find that some nineteen species are known, and that representatives are found on every continent of the earth. Thirteen of this number have been exhibited in the Zoological Park, of which eight are included in our collection at the present time. These are the European white stork, the white-bellied stork, the white-necked stork, the black-necked stork, the maguari stork, the jabiru, the Indian adjutant and the wood ibis.

The white-bellied stork is one of the smallest and at the same time, one of the most attractive species. It is a typically African bird and is so rare in collections that our present specimen, brought to us from Pretoria by Dr. A. Haagner, in 1920, is the first we have had. Its rather sombre plumage is relieved by bright red and blue about its face and the base of its bill. Strangely enough, this little stork is as deeply venerated by the African native as is the white stork by the European. It builds its huge nest of sticks close to his dwelling and receives such



THE EUROPEAN STORK

Still venerated in Europe, this stork is unique for its place in the human affections of the whole juvenile world.



THE INDIAN ADJUTANT

The Adjutant is the antithesis of beauty and grace, and this characteristic he shares equally with his relations, the jabiru and marabou.

protection as the humble human habitation can afford.

The white-necked stork is a bird of very wide distribution, being found in southern Asia, the East Indian islands and tropical Africa. In spite of its extensive range, it appears to be rather uncommon and its habits are not thoroughly well known. It is a handsome bird, its bronze-black body being well set off by the white neck. In captivity, it is decidedly rare and it has the further distinction of being one of the most difficult of the family to keep.

The black-necked stork covers a great part of the eastern portion of the eastern hemisphere, being found from the Indian and Malay Peninsulas to New Guinea and Australia. It is one of the largest and finest of the storks, handsomely colored in sharp black and white, and with clear white eyes of striking intensity. It is a hardy and vigorous bird, our single specimen having lived in the Zoological Park since 1911.

Birds are adaptable creatures, as they must be to gain a living in these days of keen competition, so it is not strange to find a group of

storks which are self-elected scavengers. The marabou of Africa is the best-known species but our only present representative is the Indian adjutant. It is a huge, ungainly creature, of sinister and vulture-like appearance. Like most birds of practically omnivorous feeding habits, it is exceedingly long-lived in captivity.

America has but three species of storks, two being found in South America and one ranging through portions of both continents. The South American maguari stork is a black and white bird, closely resembling the European form. In fact, but for a certain small matter of the disposition of the tail feathers and under tail coverts, it is in every way a true stork. It is an abundant bird of the pampas and undoubtedly is of great importance in keeping in check the small rodents that swarm there.

The largest of the American storks is the jabiru. This great, unwieldy bird has a tremendous, upturned beak, somewhat reminiscent of that of the adjutant. The beak, head and upper portion of the neck are bare of feathers, and deep black in color, changing abruptly to scarlet toward the base of the neck. The back



THE MAGUARI STORK

This South American stork closely resembles the well known stork of Europe.

of the bald pate is ornamented by a tuft of whitish down, which gives rise to the appropriate British Guiana name of "negro cop."

North America's only stork is the wood ibis, incorrectly named because of its resemblance to birds of the ibis group. It has been recorded as far north as Vermont, is still found in some numbers in portions of Florida, and extends southward as far as Argentina. It is white in general coloration, with the flights and tail black. The head and neck are bare, also black, and deeply corrugated in old birds. It thrives in captivity and specimens are always to be seen in the great Flying Cage in the Zoological Park.

THE TAMING OF ZEBRAS IN YE OLDEN TIME

THE chief book observer of the Zoological Society recently found in a record of observation, made in 1774 and 1775, a very interesting description of the Zoological Garden in Lisbon at that time and a spirited description of the efforts that had been made therein to break zebras and train them to harness. The book is entitled "The Journal of A Lady of Quality," and it is a recent publication of the Yale University Press. Primarily it is a narrative journal of travels and observations in the Carolinas in 1774 and 1775. Referring to zebra training in the zoological garden its reference is as follows:

"I had scarcely time for the next sight. It is just behind them, and indeed makes part of the same building. It is no less than thirteen zebras, but as you have often seen the Queen's ass, I need not describe them, for they are exactly the same. They have been endeavoring to break them to draw in the King's carriage, which would look very pretty, but though several grooms have been maimed and some even killed in the attempt, they are as untamed as ever, and though many of them have been colted in the stables, and began as early as possible, it has had no effect. They are infinitely stronger as well as taller than the common breed of asses, and I should think mules bred from them would both be useful and much handsomer than those they at present have."

There is a note attached, dated 1795, reading:

"There are only three zebras remaining; they were bred in this country and some attempts were made to break them in. The late Don Jaze de Menezes, son of the Marquis of Marialva (the friend of William Beckford) actually drove them in an open carriage, till they broke two or three carriages for him, and some of them had killed themselves struggling."



FEMALE MALAY SAMBAR DEER

The photograph was made to show the curious protuberance on the skull above the eye; very similar to the antler growth of a young buck. She has lived over twenty years in the Park and still is a well preserved animal.

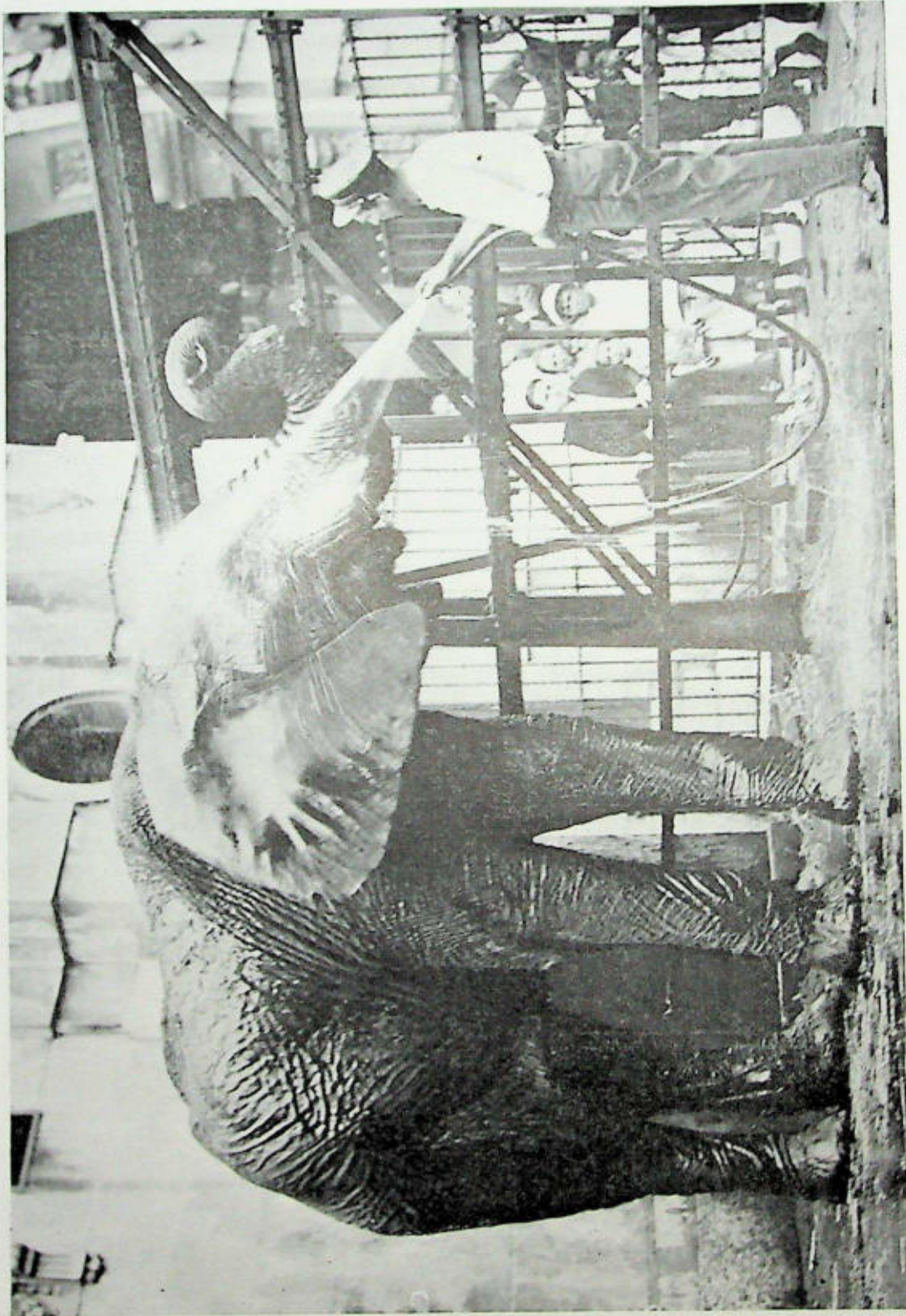
Credits for the illustrations of William Beebe's "Monograph of the Pheasants," reproduced in the March Bulletin, were inadvertently omitted. They are as follows:

- p. 32 Lady Amherst Pheasant painting, by Charles R. Knight.
- p. 34 Malay Bronze-tailed Peacock Pheasant painting, by Louis Agassiz Fuertes.
- p. 35 Photograph of courtship display of the Peacock Pheasant, by David Seth-Smith, Esq.
- p. 36 Photograph of haunt of the Green Peafowl, by William Beebe.
- p. 37 Photograph of home of the Malay Ocellated Pheasant, by William Beebe.
- p. 38. Green Peafowl painting, by George E. Lodge.

ITEMS OF INTEREST

By RAYMOND L. DITMARS

Park Labels.—From a casual examination of the labels in the Zoological Park it is probable that few of our visitors realize the work and care that is necessary in keeping this branch of the Society's educational work at a uniformly high standard. We classify this work under the head of a distinct department. Our sheet metal labels, some very heavy, others of zinc, are cut in a variety of sizes in our own shops, where the metal holders are also prepared. Our carpenter shops turn out the wooden panels for the largest



CONVERTING A SWELTERING SUMMER DAY INTO PLEASURE*

If an elephant has any preferences—one makes no mistake in believing that this preference is in favor of water; water to drink and water for a bath. Our elephants are liberally showered during the summer, and it merely is a question of how much endurance the keeper possesses, as the elephants would stand indefinitely while the cooling spray falls on their hot skins. It is a luxury in which they revel to the limit, a diversion that banishes every evil or mischievous intent.

Photograph by Elwin R. Sanborn.

types of board labels. These are of a wood calculated to best withstand the weather and hold the paint. They are braced against warping by shallow steel channels at the rear. There is a general renewal of outdoor labels each spring, and in the mammal department alone this amounts to several hundred at a time. A gradual renewal all over the Park takes place through the year. We have conducted many experiments with different types of varnish to produce the most durable results. Apart from the mechanical work upon the labels, the data composing them is prepared with great care. This is made as interesting as possible from the visitor's point of view. Some of our labels contain as much as two hundred words. Statistics, scientific data, locality of capture, date of birth, and interesting characteristics of anatomy, growth and habits are all considered in the preparation of labels. Besides the labels we display many charts and maps, a number of the latter tinted to show distribution. The maps are frequently renewed owing to the dampness from watering the decorative plants in buildings, or seepage of hay dust through the frames in buildings where hoofed animals are quartered.

Southern Reptiles.—A particularly valuable series of southern reptiles was recently presented to the Society by Mr. Arthur L. Gillam. These were captured in Florida, where Mr. Gillam has several times hunted and studied the habits of snakes. Among the snakes was a batch of the largest water moccasins that the writer has ever examined. There were over two dozen of these savage reptiles. Twelve large diamond-back rattlesnakes were collected, besides a number of species of harmless serpents. Owing to the difficulty of finding cages enough to properly quarter and feed this extensive series, we suggested to Mr. Gillam that some of the specimens be donated to associated institutions and division was subsequently made among the zoological gardens maintaining reptile exhibitions, namely at Philadelphia, Memphis and San Diego.

Wichita Bison.—As an addition to our bison herd, where a number of the specimens are becoming quite old, we recently received six fine young animals from the government herd in Oklahoma. This herd was originally established by the Society through the presentation of fifteen of the finest members of its Zoological Park herd and the shipment of these animals to the great range in Oklahoma, now known as the Wichita National Bison Range. Our new specimens were received through the courtesy of the

United States Department of Agriculture. The status of the American bison now seems to be assured. A census for the United States and Canada in 1918 showed a total of over six thousand pure-blooded bison, captive and wild. The census for 1922 shows a total of over eleven thousand bison in the same areas.

New Arrivals.—Important animals are frequently arriving this spring. Most noteworthy among rare and valuable arrivals is a female Indian rhinoceros, collected for the Society by Mr. Frank H. Buck, in Nepal, northern India. This animal is about three years old. An exceptionally handsome male Bengal tiger was recently installed at the Lion House. Among other arrivals are an Indian mouse deer, a Siberian camel and a Mongolian hedgehog. The latter rare animal is the gift of Mrs. J. B. Shackelford.

Cool Spring affects Reptiles.—This has been an unusual spring, with abnormally cold nights and backward vegetation. The Curator of Reptiles has noted much that is interesting and disappointing on his early collecting trips, which were largely unsuccessful as regards the capture of specimens. Visits to the snake dens in the Berkshires at the same dates when in past seasons we have captured large numbers of reptiles yielded meagre results. A few rattlers and copperheads were observed here and there, yet indications pointed to the snakes scattering as usual, though keeping well sheltered in leaving the ledges. We have since been unable to note evidences of the serpents remaining near the hibernating crevices later than usual. In moving away, however, they are following shattered masses of rock affording deep shelter rather than the usual thin, shelving formation which is accessible to the collector. One curious thing we noted was the retarding effect of the cold nights on masses of frogs' eggs. Some of these had been killed in the process and were strikingly distinct in the water as opalescent masses—a hue which indicates that development has ceased.

Sales of Animals.—We have made a record this spring in the sale and shipment of duplicate hoofed animals. Among the animals crated and shipped to various parts of the country were a large bull yak, a zebra, nineteen deer of several species and several Himalayan tahr. On one occasion we crated and shipped sixteen deer in a single day. It requires great care and planning to crate without injury any of the deer species, owing to their being excessively nervous



and dashing in panic about their ranges. The hazard is particularly great when bucks are in "velvet," with growing antlers, as were some of our specimens. All of our animals were, however, crated without an injury and every specimen arrived at its destination in perfect condition. We have received letters from zoological gardens to which the animals were shipped, congratulating our animal staff upon crate measurements and construction and the general handling of the animals.

Curator Ditmars' Lectures.—The Curator of Reptiles recently presented a lecture at Yale University on the theme of Evolution, illustrating the same with a series of motion picture reels indicating what the earth looked like in primitive times. A number of reptiles were used as illustrations of prehistoric dinosaurs, among these being the rhinoceros iguana, the South African zonure and the Australian shingle-back lizard. The reptiles were made to appear gigantic by the use of miniature backgrounds and tiny trees. Prof. Richard S. Hull and other members of the faculty who have specialized in the study of evolution considered the lecture to be of great interest and success and several letters of congratulation from the University have been received.



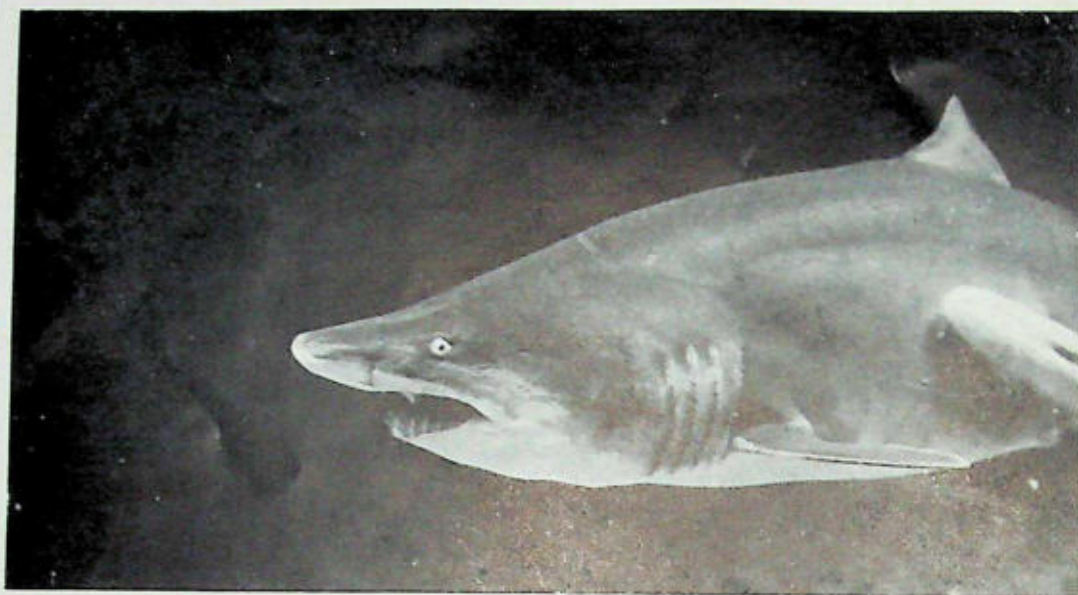
Rooting Wild Swine.—Visitors in the southern part of the Park, on passing the yards of our wild swine, are much interested in a great upheaval covering an area of many square feet. Large numbers of rocks, some weighing forty to fifty pounds, are pushed in all directions, and there are deep holes and long furrows through a macadamized surface. The area looks as thoroughly punished as a target well shattered by artillery fire, but actually represents the diversion of our bush pig, river hogs and North African wild swine. These animals display astonishing strength in exhuming and moving large rocks with their snouts and in disintegrating the macadam surface wherever a slight flaw is disclosed. We have endeavored to level the

surface on a number of occasions, but our efforts appear to stimulate the animals to more heroic endeavors. For the present we have erected a series of labels explaining to our visitors the energy of the wild swine and indicating our reason for leaving the uneven surface as a playground for strenuous diversion.



A GALAPAGOS ISLAND MOUNT

Comic draughtsmen for generations have stimulated the recalcitrant mule into life by the pursuit of an unattainable morsel just forward of his nose. Our huge Galapagan tortoise starred in a series of motion pictures, recently, spurred on by just such means. An apple on a stick produced the desired locomotion. Photographs by Elwin R. Sanborn



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 LAKE STURGEON
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NEW ROCKWORK AT THE AQUARIUM
Blue Angel-fish at left; the other fishes are Black Angels.
Photograph by E. R. Sanborn.

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VOLUME XXVI

JULY, 1923

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THE IMPROVEMENT OF THE AQUARIUM

By C. H. TOWNSEND

THE City has made provision for a moderate enlargement of the Aquarium which will permit of an increase of twenty per cent. in the exhibits; make it more comfortable for visitors; create more space for administrative work and improve its outside appearance.

Another story will be built over the present office section at the front of the building to provide space for office, library and laboratory.

This will leave the second story available for distributing tanks, ventilating and refrigerating plants still located at the rear of the building. Space on the first floor will be made available for filters and larger lavatories for the public.

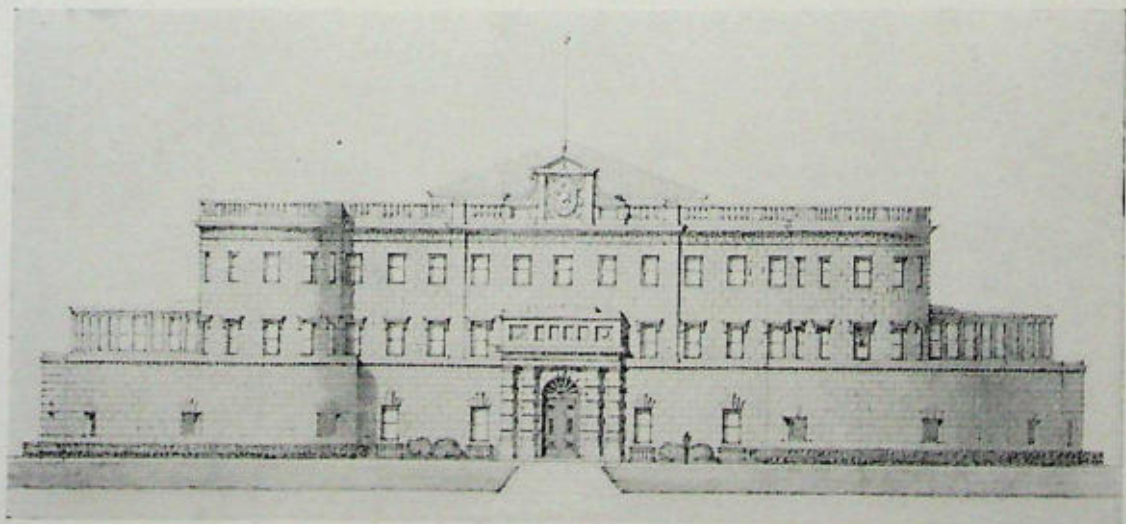
With all machinery thus removed to the front, the space reclaimed in the rear will be used for additional exhibits. Mr. Henry D. Whiton has

generously provided funds for the construction of the new tanks, and the collections of the Aquarium will be twenty per cent. larger than they are now.

The exterior of the building will be treated in a manner that will relieve it of the long-standing reproach of shabbiness. While its exhibits are larger and more varied than those of any other aquarium, the building has never presented a creditable appearance in any of the guises it has worn since it lost the dignified aspect of the simple old fort of a century ago.

The large attendance at the Aquarium—fifty-one millions in twenty-six years,—is due in part to its ideal location in Battery Park, and the Park needs just this attraction.

Nothing could contribute more to the interest



THE AQUARIUM AS IT WILL LOOK WHEN IMPROVED

Drawing showing third story at front of building. This addition creates space for office, lavatory, feed-room, repair-room, storage, library and laboratory. It makes available one-fifth more space on the ground floor for new exhibition tanks.

connected with the old Castle Garden building than its present use as the greatest of all aquariums.

During the past few years all the exhibition tanks on the ground floor have been more than doubled in size by extending their rear walls backward. They now correspond in size with those of the best aquariums in Europe. This improvement was effected chiefly through funds supplied by the Zoological Society.

It has already resulted in doubling the living collections. With the construction of still larger and better tanks in the old pump-room space, a further increase can be effected, and the New York Aquarium will have more than twice the exhibits of the largest foreign aquarium.

An addition to the equipment that has always been needed, is a sunny space for the keeping of such cold-blooded forms as turtles, frogs and salamanders, none of which have thrived in the sunless quarters hitherto available. The balcony space to be gained in the proposed alterations, will permit of the location of these exhibits in well lighted quarters on the south side of the building, together with many small fresh-water fishes from the tropics, that the Aquarium has not yet attempted to keep for lack of proper facilities.

Few persons are aware that the Aquarium already has a high class mechanical equipment for the keeping of its living collections. The concrete reservoir under Battery Park, containing 100,000 gallons of pure stored sea-water is the equal of any abroad and serves its purpose admirably. Its new electric pumping plant, the gift of Mrs. Sage, is the best in the world.

The Aquarium is however, something more than a mere exhibition of aquatic life. It is in fact a public museum and always has been called upon to render the educational and other services demanded of such an institution. With the facilities now granted, its activities will be expanded and its position in the life of the City become of still greater interest.

THE SWORDFISH AND THRESHER SHARK DELUSION

By C. H. TOWNSEND

IN these days, with all the world in the nature class to some extent, and with a million cameras making records of what happens in the animal world, the persistence of old-time misconceptions in natural history is a fact naturalists still have to reckon with.

Many of them, like the "hoop snake," "sea serpent" and "fire salamander" myths, are endowed with a vitality that seems to outlast all teaching to the contrary. They cling to certain kinds of minds like mortar to a brick.

One of the long-enduring kind is the fable of the whale and its alleged enemies the swordfish and the thresher shark. It appears in the newspapers every summer in the accustomed form; passengers on a liner have seen at a distance a great commotion in which the whale appears to be the object of a violent attack. They have been told by the officers that the swordfish and the thresher are the aggressors, and the reporters present the account of what was supposed to have happened, in more or less interesting form.

The officers of the big liners being, presumably, neither whalers nor naturalists, it is unlikely that their opinions on this matter are of value.

The late Professor Goode, distinguished ichthyologist, who studied the swordfish more thoroughly than any other naturalist says:

"Skeptical modern science is not satisfied with this interpretation of any combat at sea seen at a distance. It recognizes the improbability of aggressive partnership between two animals so different as the swordfish and a shark, and explains the turbulent encounters occasionally seen at sea by ascribing them to the attacks of the killer-whale, *Orca*."

The killer-whale (*Orca gladiator*) is a large carnivorous porpoise, reaching a length of about thirty feet, and is armed with formidable teeth. Killers hunt in packs, destroying whales, porpoises and seals, and are able to swallow both seals and porpoises entire.

In attacking whales, some of them tear away the lips and tongue, while others seize the fins, or leap from the water and deal heavy and farsounding blows by falling on the whale's back. In making such leaps, they sometimes breach clean over it.

Killers roam all oceans and are veritable marine wolves in the destruction of their prey.

Let Captain Scammon, shipmaster, whaler and naturalist, who has given the world one of its best books on the whales, tell about this enemy of the whale: "We saw an attack made by three killers upon a cow whale and her calf. They made alternate assaults upon the old whale and her offspring, finally killing the latter, which sank to the bottom, where the water

KILLER WHALE (*ORCA GLADIATOR*)

A group of killers displaying their high dorsal fins.
 Photograph by Lawrence Mott at Catalina Island, California.

was five fathoms deep,—the three orcas descended, bring up large pieces of flesh in their mouths which they devoured after coming to the surface." Seammon refers to the loss of whales killed by whalers, while being towed to the ship. They were attacked by killers "in so determined a manner that, although they were frequently lanced, cut with boat-spades, they took the dead animals away from their human captors, and hauled them under water out of sight."

Many whalers have experienced this. I once boarded a whale ship in Alaskan waters, where the captain told me with tears in his eyes, of the loss of a whale in this manner a few days before. His boat crews could do nothing in defense of their prize, which was actually torn to pieces and sunk, the numerous big killers coming to the surface repeatedly with its flesh in their mouths. This happened under the eyes of all hands. The tale was told so graphically that I have often regretted not having recorded the details in full at the time.

All marine animals fear the killer. I once landed from the U. S. S. *Albatross*, on Lighthouse Rock, south of the Alaska peninsula, to kill one of the large sea lions found there, for the National Museum. While the sailors were at work removing the skin, we noticed that the sea lions remained on the rocks, notwithstanding their fear of our party. Fifty yards off shore were two large killers whose dorsal fins projected three or four feet above the surface. None of the sea lions ventured into the water, their fear of the killers exceeding their fear of man.

Founded on erroneous observation of a sea fight of

common occurrence, the swordfish and the thresher shark still get the credit of attacking and defeating the colossal whale which is not only inoffensive, but which neither of them could eat.

The swordfish uses his two-edged sword with rapid side-wise blows among schools of small fishes, stunning numbers of them which he afterwards gathers into his entirely toothless mouth.

It would be impossible for the swordfish to bite out a mouthful of whale meat for the reason that it is not only toothless but that its upper jaw being extended into a long sword, it could not bring its jaws to bear on an object as bulky as a whale. Imagine the swordfish "biting off mouthfuls of the whale's tongue," as it has been said to do, with such an encumbrance on its upper jaw as a four-foot sword sticking out straight ahead. The sword on the wall before me is almost that long.

The thresher has similar limitations. Like the swordfish, it is a feeder on schools of small fishes, which it herds together with much "threshing" of its remarkably long tail. It is not a large-mouthed shark and its teeth are of small size, not at all adapted for large prey. While the tail of the thresher is as long as all the rest of its body, and effective in rounding up the schools of mackerel, bonito, herring, menhaden, blue fish and squid—just what the swordfish is known to eat—it could have but little effect on the hide of the great cetacean.

Captain Atwood, shipmaster and fisherman, at a meeting of the Boston Society of Natural History said threshers were abundant at Provincetown, and that he placed no confidence whatever in the stories current of attacks on the whales by the thresher. He also said that

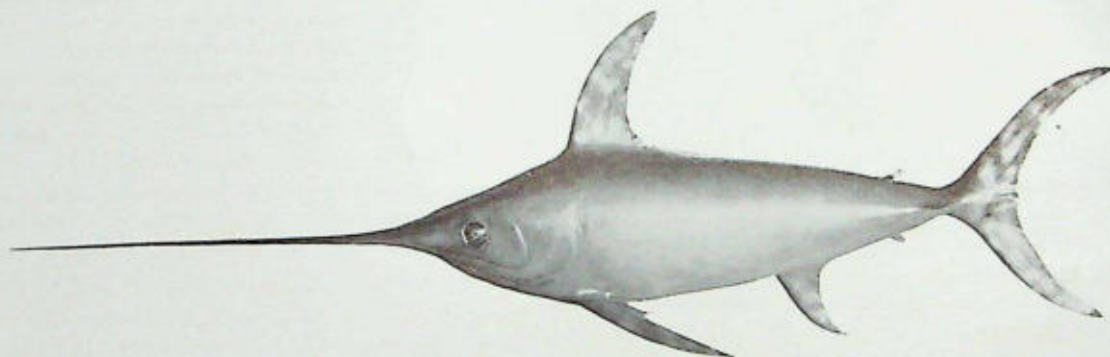
KILLER WHALE (*ORCA GLADIATOR*)

Photograph by Lawrence Mott at Catalina Island, California.



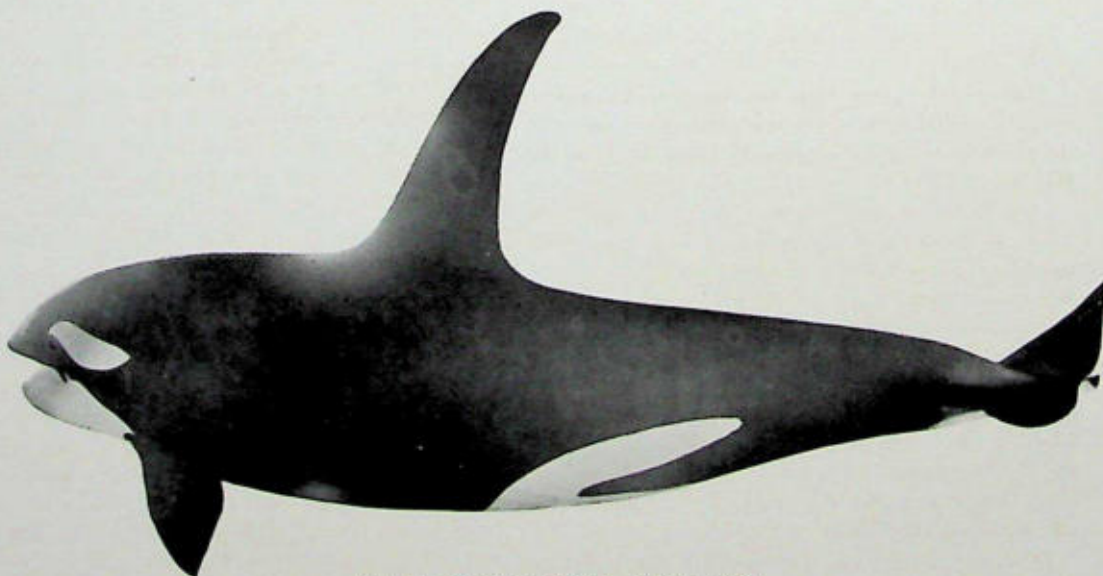
THRESHER SHARK (*GALOPECIAS VULPES*)

The thresher in company with the swordfish, is erroneously charged with attacking whales.
Courtesy, American Museum Natural History.



SWORDFISH (*XIPHIAS GLADIUS*)

The swordfish in company with the thresher is erroneously charged with attacking whales.
Courtesy, American Museum Natural History.



KILLER WHALE (*ORCA GLADIATOR*)

A carnivorous whale, the deadly enemy of whales, porpoises and seals.
Courtesy, American Museum Natural History.

he had no evidence that swordfish ever attack whales.

The swordfish hunters at Block Island tell me that sharks and the swordfish do not associate, but actually keep away from each other. Why should the thresher shark be an exception?

Here is an old time example of the story, dated 1609:

"Whale, Swordfish and Thresher.—The swordfish swimmes under the whale, and pricketh him upward. The thresher keepeth above him, and with a mighty great thing like unto a flaile, hee so bangeth the whale, that hee will roare as though it thundered, and doth give him such blowes, with his weapon, that you would think it to be a crake of a great shot."

Buckland, the naturalist, was given the following by Hill, an English captain:

"I have seen these 'ere thrashers fly out of the water as high as the masthead and down upon the whale, while the swordfish was a-pricking of 'im up from underneath. There is always two of 'em, one up and one under, and I think they hunts together."

It seems to us that the *masthead* leap is a bit too high even for the active thresher.

Here is a version that confirms the killer as the aggressor:

"The swordfish is the whale's greatest enemy, and when he kills one he eats nothing but his tongue, leaving the rest to the shark, walrus, and birds of prey."

Naturalists know that the inoffensive walrus neither would nor could bite into a whale with its clam-digging tusks placed altogether in the way of its jaws.

Another version of this hoary tale appeared in a New Zealand newspaper: As usual, the toothless swordfish was trying to ram his sword into something he couldn't eat and from which he probably couldn't withdraw his deeply driven and brittle weapon. The "swordfish," finally knocked out by a whack of the whale's tail, was picked up by fishermen, who found that the whale's blow had almost knocked off the *back fin* of the alleged swordfish. In this particular case the ubiquitous thresher was reported as *not* being among those present.

It would be difficult to demolish the back fin of a swordfish, which instantly folds down out of sight into the deep groove in which it is placed leaving nothing to knock off, while a blow sufficient to knock off the high, rigid dorsal of the killer would really mean something. The back

fin of a large killer is more than five feet long. In this case it is clear that the aggressor was a small killer.

Professor Goode refers to descriptions showing "how the swordfish and the killer whale have been confused." Indeed, in some of the older accounts of attacks on the whale, the writers, describing the killer's work accurately enough, refer to its long back fin as its *sword* and call the creature "swordfish." We should not take seriously the newspaper story and the excited fishermen's identification of the creature making the attack.

The real swordfish has been charged with the murder of whales in sheer wantonness. It is not wantonness, but pain, that prompts the harpooned and frenzied swordfish to ram a boat. The writer's former shipmate, the late Willard Nye, sent Professor Goode this statement by Captain Dyer, a swordfish hunter:

"A number of boats, large and small have been "stove" by swordfish on our coast, but always after the fish had been struck."

There is abundant evidence that swordfish have struck many ships and left their swords in the planking. We have seen in the Philadelphia Academy of Sciences a two-inch piece of planking with a swordfish weapon rammed tightly into it.

Professor Goode says: "No instance had ever been recorded in which a swordfish had been able to withdraw his sword after attacking a ship." A swordfish without a sword has no means of earning a living. However strong when driven with great force into a ship's plank, the sword is rather brittle, one in my own collection having snapped in two when accidentally pushed off a table. Of course there can be no question about the force behind the sword when the big fish is in action.

The swordfish was introduced into the whale killing stories long ago, simply because he bears a formidable weapon and is known to be dangerous when wounded.

We once returned to Block Island from a swordfish hunt, and found one of the crew of another swordfish vessel being taken ashore with a lacerated leg. A swordfish had been struck and was rushing about dragging the buoy attached to the harpoon line. A boat was lowered to pick up the buoy, which he charged, penetrating both the boat and the leg of the boatman.

Roy Chapman Andrews, well-known naturalist, in "Whale Hunting with Gun and Camera," discusses this matter as follows:

"Another story which is undoubtedly purely mythical although it has an astonishingly wide credence, is that of the swordfish and the thresher.

"I have personally interviewed a number of men who were reported to have witnessed such a combat,—swordfish against the whale—but have never found one who had seen a swordfish or had any evidence of one being there, although the killer could easily be seen.

"The killer's habit of forcing open a whale's mouth and eating the tongue from the living animal is an extraordinary method of attack. I had always been skeptical as to the accuracy of this report until my own experiences with the gray whales in Korea, where its truth was clearly demonstrated.

"Of thirty-five gray whales which I examined especially, seven had the tongues eaten to a greater or less extent and one had several large semi-circular bites in the left lower lip.

"The killers do not confine their attention to the tongue, for almost every whale which was brought in had the tips and posterior edges of the fins and flukes more or less torn. In several specimens fresh teeth marks were plainly visible."

Dr. F. A. Lucas, Director of the American Museum of Natural History, examined many whales at the shore whaling station of Newfoundland. He found that the majority of the sulphur-bottom whales brought in bore marks of the teeth of killers, but saw no injuries that could have been inflicted by either swordfish or thresher.

Another naturalist, a specialist on sea life, Dr. Robert Cushman Murphy, who spent eleven months aboard the whaler *Daisy*, and several months at one of the Antarctic shore whaling stations, scorns the stories about swordfishes and threshers as enemies of the whale. He tells me that the encounters he has seen at sea were clearly attributable to killers.

During my own service of ten years as resident naturalist of the *Albatross*, the fearful work of the killer among the whales was brought to our attention many times by whalers in Bering Sea and by pelagic sealers along the coast of Japan. We never succeeded in getting a straight story about either swordfish or thresher, while the accounts of the killers seldom varied from the known facts.

Swordfish strike ships by accident when seeking elusive schools of fishes. One whaleman tells of schools of albacore seeking the shelter of a becalmed whaler to avoid the attack of a swordfish swimming deeply beneath them:

"It was apparent that he feared to make his upward dart against the bright copper bottom of the strange monster floating above."

"The swordfish approached closer and the albacore darted away. The swordfish was almost instantly in the midst of the flying throng, and with cut and thrust of his sword, too rapid for the eye to follow, he killed several instantly. As I observed his motions I saw an explanation why the swordfish occasionally strikes the bottom of a vessel and drives his formidable weapon through the planks. It is simply done in his over-eagerness to catch his prey."

Many oceanic fishes have the habit of sheltering in schools beside or under slow moving vessels, and thus bring the vessel in line with the rush of the hungry swordfish. They also seek the shelter of whales, thus subjecting the latter to the chance of being struck.

Several whalemen and sailors who afterwards became authors, have told the killer story with due conservatism, but when they come to the matter of assistance from the swordfish and the thresher they fall off badly, merely reciting the old fable with variations. Their fascinating books are marred with statements on natural history that will not stand critical examination.

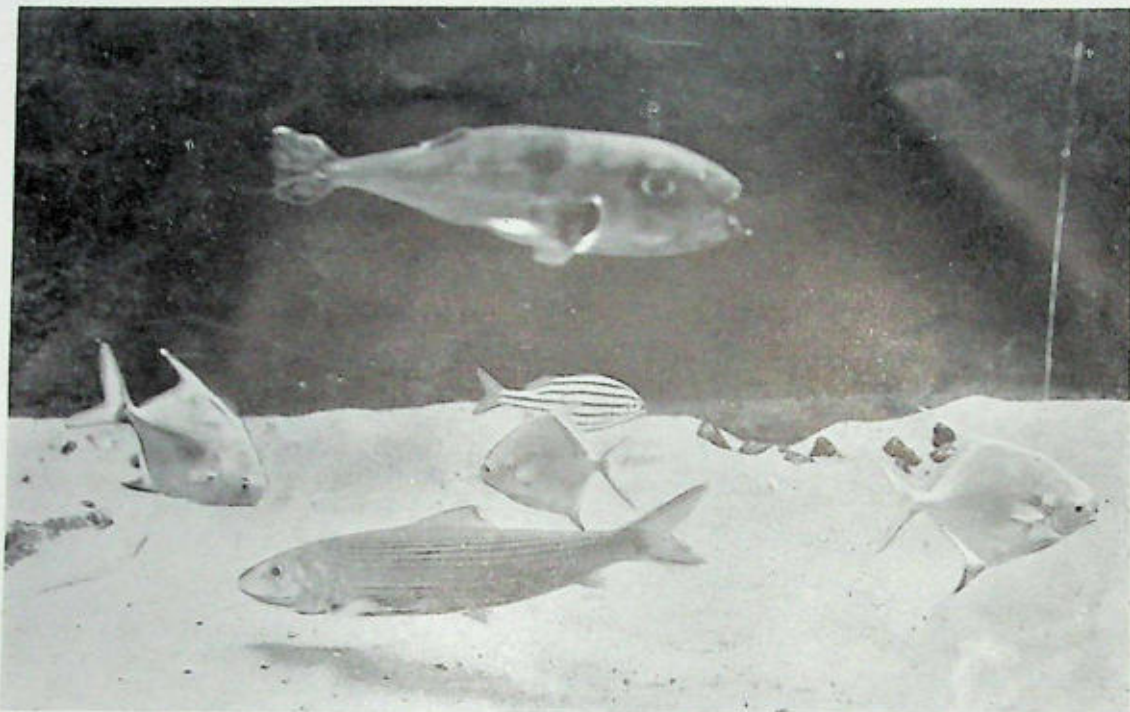
THE SMOOTH PUFFER

(*Lagocephalus laevigatus*)

AMONG the more or less oddly shaped fishes which visit our shores late in summer is the smooth puffer. Although of rather rare occurrence, specimens have from time to time been brought to the Aquarium where unfortunately they did not long survive.

A specimen taken at Sandy Hook in October, 1922, by the well-boat *Seahorse* has however exhibited an unexpected hardness in captivity which is most gratifying. The accompanying photograph by Mr. Sanborn is probably the only one ever made of the living fish.

While specimens of the smooth puffer hitherto received at the Aquarium have not exceeded fifteen inches in length, it is known to grow much larger, Mr. Mowbray of the Aquarium staff having speared a three-foot specimen in Bermuda.



RARE VISITORS AT THE AQUARIUM

Smooth Puffer (above). Bone-fish (below). Permit (right, left and center). Orange-striped Grunt (lower background).

Photograph by Elwin R. Sanborn.

The smooth puffer is dark above, the sides and lower surface being silvery. It is smooth and scaleless on back and sides, the belly being covered with spines which usually lie flat and are not visible in the swimming fish. Like other species of puffers it has the habit of inflating the abdomen when alarmed.

It is sometimes called rabbit-fish from the shape of the head and this is the meaning of the name *Lagocephalus*.

The very young of the smooth puffer seem to be unknown although specimens two and one-half inches long have been taken in Porto Rico.

C. H. T.

GELATIN AND JELLY FISHES

A YOUNG man asked the Aquarium whether there was gelatin in jelly fishes and if so how it could be extracted. He wished to know also what was the nature of the composition in a jelly fish's tentacles which caused it to be so poisonous to human flesh.

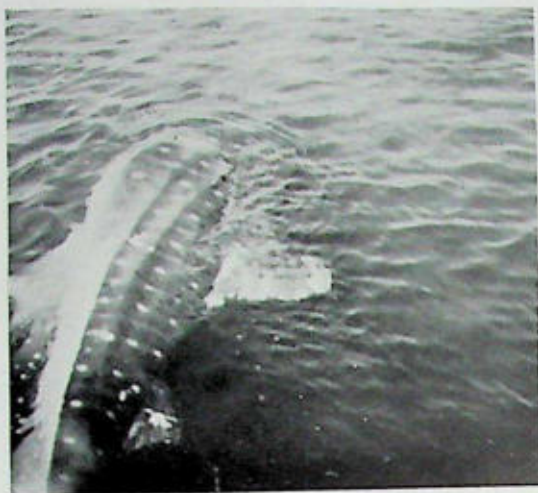
We were very well able to tell him that although jelly fishes are sufficiently solid to have been preserved in fossil remains, they are nevertheless mostly composed of water and after the sun has dried them out nothing remains but

a thin film. We had not heard of anyone attempting to make gelatin out of the so-called "gelatinous substance" of the jelly fish, but, learning from the *Century Cyclopedia* that "Gelatin does not exist as such in the animal tissues, but is formed by the action of boiling water on connective tissues, cartilage, ligaments and tendons as well as on skin, horn, fish-scales, etc.," the writer boiled down a jelly fish brought in dead by the Aquarium collecting boat. After half an hour the receptacle contained a liquid that smelled like clam broth, and not even a film remained to represent the defunct coelenterate. The liquor, after standing two days, failed to "jell."

When these inquiries were received Dr. A. G. Mayor, the great authority on medusae, was living and we asked him concerning the nature of the poison in a jelly fish's tentacles. He replied that although there is some formic acid in the poison, "the stinging is too severe to be due wholly to this. Mechanical puncture of the tissues also would not account for the severity of the sting; hence there is probably an additional unknown poison."

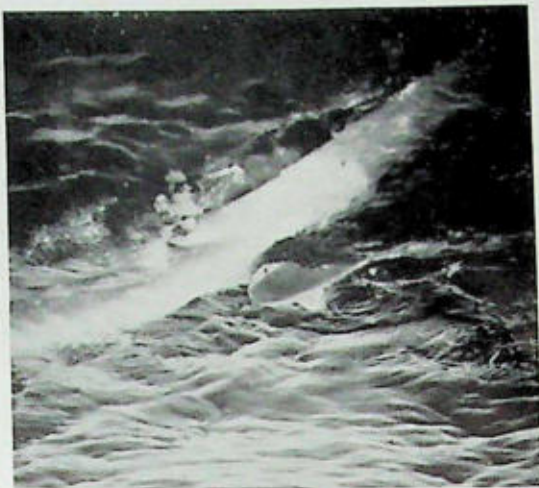
This may be taken to be the last word on the subject.

I. M. M.



WHALE SHARK

Note the conspicuous spots with which the body is covered.



LEOPARD AND WHALE SHARKS

Leopard shark seizing fin of whale shark while the latter was in tow.

THE TAKING OF A WHALE SHARK (*Rhincodon typus*) IN SOUTHERN FLORIDA

By LOUIS L. MOWBRAY

Photographs by D. L. Williams

WHILE Captain Newton Knowles of the *Edithia* was conducting a fishing party for Mr. Claude Nolan of Jacksonville, in Florida waters, they sighted on the morning of June 9, 1923, the fin of a large shark. On approaching, they found it was a whale shark that had evidently wandered or had been carried by the current into shallow water. The fish was circling within the lagoon which at no place exceeded twenty feet in depth and is surrounded on three sides by mud flats.

Captain Knowles harpooned the fish about 11:00 A. M. After several hours' fight and sixty rifle shots had been fired into the monster, many of which were shot into the base of the tail, the big fish became somewhat subdued. A tow line was secured to the tail and the fish was towed to Long Key dock. It took the three motor boats twelve hours to make the sixteen miles.



WHALE SHARK IN TOW

Note at right, great width of tail.

The writer arrived at Long Key on the morning of the 10th and found the shark still alive. Mr. Nolan on hearing of my desire to secure the specimen for the American Museum of Natural History, at once became greatly interested and presented it. I immediately made a description of the living specimen and arranged to have the shark towed to Key West, where it could be docked and handled to greater advantage by the preparator, Mr. Limekiller, who was sent down by the Museum.

The tugboat *Liberty* of Key West made a little more than three miles an hour towing the big fish until the Coast Guard cutter *Cossack*, in charge of Lieut. Brown, arrived. Just at that time we were busily engaged in fighting off the leopard sharks by pounding them with oars and boat hooks. These sharks had been attracted in large numbers by the smell of blood and oil, some of them being of great size, apparently exceeding fifteen feet in length and showing the greatest ferocity, sliding up on the carcass for four or more feet, trying to bite the portion that was above water. After making a request for assistance, Lieut. Brown gave us a line and

helped tow the shark to Key West, which took eighteen and a half hours.

After docking the shark, it was a disappointment from a photographic point of view, for the cartilaginous structure was of such a flexible nature that it collapsed.

The specimen was then dissected and the parts necessary for anatomical study and reconstruction were shipped to the Museum.

The specimen measured thirty-three feet in length and twenty-three feet in girth behind the pectoral fins. It was estimated to weigh between fifteen and twenty tons.

A WHITEFISH SAVED BY STRIPPING

By IDA M. MELLE

OUR prized whitefishes, hatched at the Aquarium in January 1913, have dwindled to less than fifty; and when, on April 16, 1923, Director Townsend called my attention to a specimen that was bloated and apparently egg-bound, we naturally sought to save it if possible.

Although it was a bit late in the season for a whitefish to be carrying eggs, as others among its companions were gravid in January, the fish was removed from the tank and found to be actually egg-bound, or, in the parlance of the fisheries, "plugged." The vent was obstructed, and it became necessary to cut through the obstruction with a steel forceps inserted fully one inch into the body of the fish through the vent. Then, under manipulation, the eggs began to flow from between the prongs of the forceps—about 3,000 of them—some only dry and yellow shells, others in a state of decay. The eggs themselves were not sufficient in number to have caused the bloating of the fish. This was due to gases arising from them as they decayed.

When all the eggs had been extruded, the fish was placed in a reserve tank in order that its behavior might be observed. Instead of floating on its back and gasping hard, as whitefishes generally do after removal from the water for any reason, this specimen began to swim vigorously about the tank, and to cavort and gamble, as it were, like a young lamb. Whitefishes are rather sedate, and this frolicking was probably not due to a feeling of elation on the fish's part, though it must have experienced immediate and immense relief, but more likely to some temporary irritation resulting from the operation.

The next day the fish presented a normal

appearance and was, as her "keeper" expressed it, "happy as a clam at high tide." She was returned to her companions and is still alive and well. Except for the operation, she would have died.

Because there is no external difference in the sexes of whitefishes, the Director ordered the specimen tagged, that it might be known in future as a female. This was done by inserting an aluminum button in the tail.

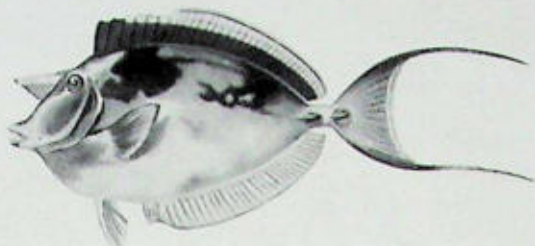
Lacking the natural impulses of a wild environment—the driving by the males, the preferred places for nest-building or for depositing the eggs among vegetation, etc.—fishes in captivity have a tendency to become egg-bound, or roe-bound as it is also called. Fine specimens of goldfishes and other valuable species may be saved by stripping, just as we saved the whitefish. The formation of gas and the consequent abnormal bloating of the fish, will always give warning.

In stripping, the specimen should be taken in the left hand and held firmly by the tail, upside down, with the head toward the operator, while the right hand grasps it just below the throat. The right thumb may then be used to press the eggs gently downward toward the vent; and if they do not come readily, one can safely assume that the vent is blocked. A small lead-pencil or similar instrument will serve to cut through this obstruction. An ideal method employed by the United States Bureau of Fisheries, as I am informed by our Mr. Howley, formerly of the Bureau, is to insert a small tube and let the eggs flow out through that.

Lecture on the Aquarium.—Some years ago Professor Bristol lectured twice weekly on the New York Aquarium. At that time few fine photographs of aquatic animals had been secured. Miss Mellen took up the work of lecturing on the Aquarium last winter, illustrating her talk with about seventy-five lantern slides made from Mr. Sanborn's excellent photographs of Aquarium subjects, and also showed half a dozen motion picture films of fishes swimming in the tanks. The lecture was given before 1,200 men in Sing Sing Prison, several hundred men at the Home for Disabled Soldiers at Kearny, N. J., at the Staten Island Institute of Arts and Sciences, St. George, S. I., before the John Alden Kindred at Lockwood Academy and at other places in Brooklyn, and part of it was broadcasted from "WJZ" Newark. It was a marked success and will be given again next season.

HINALEA (*COMPHOSUS TRICOLOR*)

It is a pity that its beautiful colors are not shown here.

KALA (*ACANTHURUS UNICORNIS*)

It wears a horn between its eyes and two defensive spines on each side of its tail.

THE HONOLULU AQUARIUM*

By MRS. ANITA N. BUSCH

THE Aquarium at Honolulu is located in Kapiolani Park on Waikiki Beach about four miles from the city.

It was built in 1904 by Mr. and Mrs. Charles M. Cooke on land donated for the purpose by Mr. James B. Castle, and is maintained by the Honolulu Rapid Transit Company.

The building which cost originally \$20,000 has been improved from time to time. The central part of the structure is circular in form, with a single open pool. Radiating from the central section are three corridors containing thirty-six glass-fronted tanks.

The exhibits consist chiefly of showy fishes from the neighboring coral reefs, there being about 100 different kinds and from 400 to 500 specimens. The exhibit as a whole is wonderful and is doubtless the best display of tropical fishes in the world. It seems impossible to describe the strange forms and amazing colors of

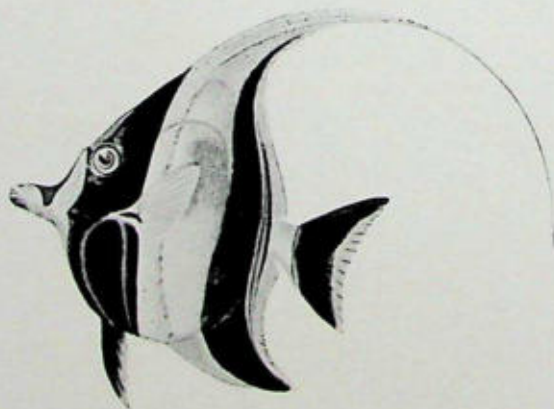
* (From a letter received from Honolulu).

the fishes. The colors are as brilliant as those of tropical birds or butterflies. There are amazing combinations of reds, blues, greens, yellows and purples. Among the fishes are the bird-fish—Hinalea Iwi with the green of the peacock; the Unicorn—Kala, with forward projecting horn on its head and two sharp spines on each side of the tail. The long-snouted Nukunuku flitting through the water like a brownish-yellow canary, and the Kihikihi with a long plume-like fin.

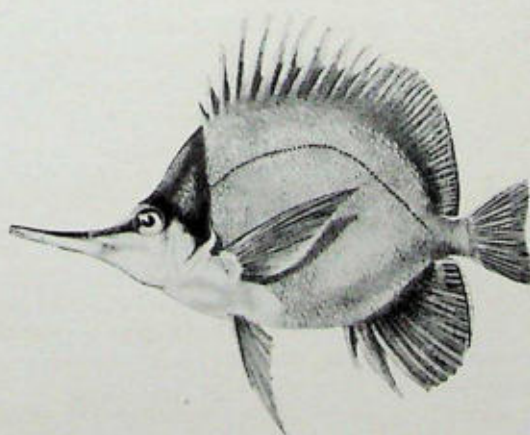
The Aquarium is open throughout the week at a charge of 25 cents with the exception of Saturday when it is free to the public. All receipts are devoted to the improvement of the collections.

In 1919 the Aquarium was taken over by the Territory of Hawaii and placed under the management of the College of Hawaii. A well-equipped marine biological laboratory is being established in connection with the Aquarium, which is to be a center for scientific research in the Pacific.

The Aquarium is visited by about 50,000 persons annually.

KIHIKIHI (*ZANCLUS CANESCENS*)

A harlequin in black and gold.
Photograph by Elwin R. Sanborn

NUKUNUKU (*FORCIPIGER LONGIROSTRIS*)

One of the oddities of the Honolulu Aquarium.

New York Zoological Society



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☐ A PUBLIC ZOOLOGICAL PARK. ☐ A PUBLIC AQUARIUM. ☐ THE PRESERVATION OF OUR NATIVE ANIMALS. ☐ THE PROMOTION OF ZOOLOGY.

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ELWIN B. SANBORN, Editor

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Each author is responsible for the scientific accuracy and the proof reading of his contribution.

VOL. XXVI JULY, 1923 No. 4

SWORDFISH TAKEN ON TRAWL LINES

By C. H. TOWNSEND

In the issue of *Science* for July 7, 1922, the writer reported the taking of thirteen large swordfishes late in the month of December, 1921, on trawl lines set for tilefish in deep water about 110 miles southeast of New York. Four vessels participated in the captures and the trawls were set in depths varying from 95 to 125 fathoms.

It is interesting to note that another swordfish was obtained under similar circumstances in December, 1922. Captain Ben Olsen of the schooner *Columbia*, one of the vessels which took swordfishes on trawl lines the year before, makes the following statement:

"While fishing for tilefish about eighty miles south by east from Block Island, a swordfish was found on the trawl line when hauled to the surface. It was entangled in the trawl apparently in the effort to obtain some of the tilefish which had been hooked. The line had been set at a depth of eighty fathoms and the

presence of the large fish was first felt at a depth of about twenty-five fathoms while it was being lifted. The swordfish was alive when brought to the surface. The trawl line was looped around the sword close to the head and several times around the body. This swordfish weighed 410 pounds and was sold to a fish dealer at Block Island."

These captures of swordfishes are interesting as showing their presence in the latitude of New York in winter, their abundance in summer when they are pursuing the schools of menhaden and mackerel having always been well known.

Their capture on trawl lines is not new, as they have been taken a few times in this manner on the northern cod and halibut fishing grounds. The swordfish is not known to spawn anywhere along our coast and specimens weighing less than twenty-five pounds are not taken there.

It spawns in the Mediterranean in summer at the very season when most common in our waters. Fishermen do not see it on the surface in winter, although we now have some reliable records of winter catches on trawl lines set in deep water. Its movements therefore remain for the most part unknown.

We are indebted to Mr. Henry D. Whiton of New York for reporting all the above mentioned captures of swordfishes on trawl lines, the information coming to him through Mr. Haraldson, the master of his yacht.

MEMBERSHIP OF THE SOCIETY

The following persons were elected members of the Society, May 10 and June 13, 1923, by the Executive Committee.

MAY 10, 1923.

Life

Charles H. Jones

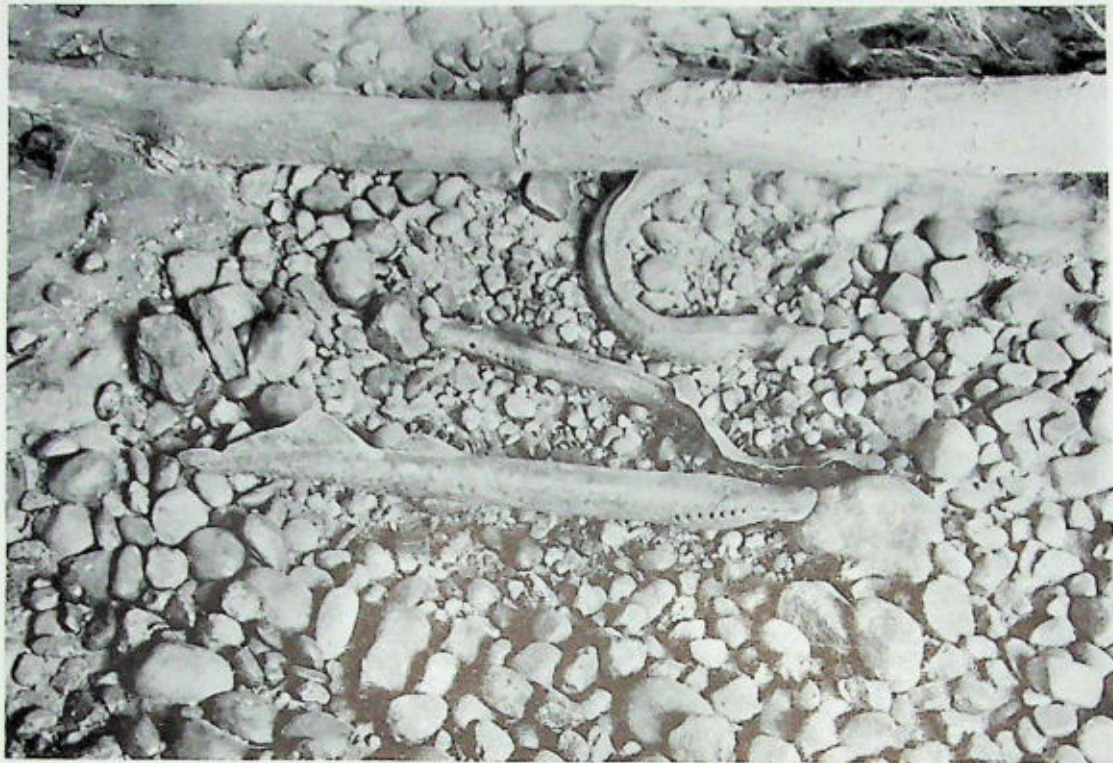
Annual

Mrs. Don A. Baxter	Mr. John Insley Coddington
Mrs. Fordham Morris	Samuel B. Potter
Orlando F. Weber	Mrs. Alfred Wagstaff
Miss Clara Altschul	W. Seward Webb, Jr.

JUNE 13, 1923.

Annual

Miss Emma W. Calkins	Mrs. Gardner Cornett
Dr. Max Einhorn	H. M. Webster
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George W. Naumburg	Arthur A. Binswanger
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LAMPREYS CLEARING A PLACE FOR THEIR NEST

From a habitat group in the American Museum.
 Courtesy, American Museum of Natural History.

SPRING NOTES ON LAMPREYS

By C. M. BREDER, JR.

LEAVING the Battery on the venerable little side wheeler *Albertina* which has plied from New York to Redbank, with a mixed cargo of passengers and freight for more than thirty years, a two hours' journey through New York Harbor and up the Shrewsbury and Navesink Rivers brings one to that picturesque New Jersey town nestling at the bank of the Navesink, or North fork of the Shrewsbury, long famed for its winter sport of ice boating which is unexcelled in these parts. The journey made in spring on a calm day gives one sudden relief from the bustling activity of the city as soon as the old craft paddles its way into quiet Sandy Hook Bay, where she dodges between the checkering pound nets just being planted by the Port Monmouth fishermen to intercept the early runs of weakfish and menhaden. The shifting bottom of this sandy inlet not infrequently embarrasses the skipper during the especially low tides of spring, as, occasionally she runs afoul of some unexpected sand bar,

thereby prolonging the journey considerably beyond the allotted two hours.

Once docked, a short walk through Redbank brings one to a small canoe-renting establishment on the historic Navesink. From this place by slipping up the Swimming River, which joins the Navesink here, to a point about ten miles above where a dam would make a portage necessary, a delightful half day may be spent paddling slowly along, enjoying the absence of one's fellow man and the presence of innumerable lesser animals. The trip recorded was made in order to observe and study the sea lamprey (*Petromyzon marinus* Linnaeus) which at this time pass up these rivers in droves, urged to their spawning grounds by the irresistible forces of nature in their bodies.

On the lower reaches of the Swimming River, the abundant kingfishers rattle and plunge headlong continually while less often ospreys drop suddenly with a splash, feet first, to seize their prey from beneath the surface. Along the banks, the spotted sandpipers teeter about constantly and numerous little green herons flap their awkward way onward a few hundred feet

in objection to uncomfortable approach, whilst occasionally a stately great blue passes high over head. Further upstream where the force of the current increases and the banks draw closer together these birds give way to the upland types, along with an increasing number of the basking painted turtles which crowd emerging stumps and crags. Bob-whites call incessantly from every open space and several silent flights of four or five mourning doves almost escape notice as they wing their quiet ways. The red-winged blackbirds, abundant below, become fewer and finally disappear altogether with the increasing density of the stream-side foliage accompanied by an increasing number of the typical sylvan birds such as numerous small warblers, chewinks, phoebes, ovenbirds, red-eyed vireos and others. While the observation of birds was not the object of the trip and not even a pair of field glasses was taken along, nevertheless thirty-five species insisted on thrusting themselves upon the attention. The successful attacks of crows and red-wings upon the more formidable appearing ospreys with their always attendant racket could not be overlooked, nor could the stealthy descent of an old red-tailed hawk and its successful capture of a doomed chick from a nearby barn yard escape passing attention. Thus the old but ever new drama of out doors enacting an encore each spring, with its mingled pathos and humor fascinates and instructs those of us who have learned to receive real pleasure and profit from such commonplace but stimulating spectacles.

On arriving at the dam it is necessary to await nightfall before a glimpse may be had of the migrating lampreys, for not before it is thoroughly dark, do these eel-shaped creatures begin their struggles to attempt the ascent of the dam; their totally impassable barrier. While their outline roughly resembles that of an eel it is no indication of any relation, as these curious animals are near the base of the "stem" which gave rise to all vertebrate forms, while the eel is a member of a much more recent offshoot. Properly, they are to be considered as a very specialized branch of the primitive vertebrate stock although a few naturalists have suggested that they may be degenerate fishes which were once further advanced. However, they are not to be considered as fishes at all, according to the modern definition of that term, and are simply ordinarily discussed with them as they are more nearly related to that heterogeneous group than to any other. The most obvious difference between the lamprey and any fish is the absence of true jaws in the former.

A suctorial disc and a movable tongue, both of which are covered with a series of rasp-like points resembling teeth, are present in place of it.

It is this disc that enables the lamprey to do its far famed destructive work of boring into the bodies of living fishes and slowly drawing their life juices from them. The powerful suction they are able to exert also makes it possible for them to scale walls of some height, even in the presence of a strong adverse flow, by hitching along with the mouth attached to some solid surface, although the dam spoken of proved to be altogether too much for them. Certain species of the Pacific coast lamprey are much more proficient in this method of locomotion than our local forms.

Preparatory to spawning, when the lampreys have attained a place sufficiently far from the ocean with a suitable bottom, they clear a nesting site by removing the top layer of rocks of the stream bed. Even those of considerable size, these curious brutes are able to move.

Their method is to attach themselves to a stone by means of their suction disc and then go through the motions of swimming vigorously. Thus by the combined force of the moving stream and their own muscular efforts large rocks are moved about. Those specimens shown in the photograph on the spawning beds are in the act of so clearing a nest. To test the power of this suction, I was so indiscreet as to allow one to attach itself to my arm (out of water) in the belief that the "teeth" would not be brought into play, thinking that the fleshy lips forming the edge of the sucking disc were used for attachment and that the "teeth" were only employed in feeding. Be that as it may, the creature planted his "teeth" so forcibly against the skin that, if I had not flung it off almost immediately it would have drawn blood. Even at that, for the ensuing half hour, the area on which it was attached was sore and red, and the depressions made by the "teeth" remained for some time.

The migration up-stream and the production of great quantities of eggs and sperm is such a drain on their vitality that it is generally conceded that they die after a single spawning season. In addition to the above, they suffer many physical injuries from abrasions on rocks and lacerations from their over-energetic companions and become so infected with disease that those taken near the end of the season are covered with raw patches and are so lean that they present a most repulsive spectacle.



THE FOOT OF THE DAM

The limit of the lampreys' advance.
Photograph by C. M. Breder, Jr.

At such times when the water is allowed to flow over this dam it gravitates rapidly at a steep angle over smooth boards. To these the lampreys cling, inching their way upwards sometimes half way to the top before exhaustion overtakes them and catapults them back again. At other times the water is allowed to issue from flume pipes alongside the dam. When this is done the lampreys attempt to stem the powerful current set up, frequently leaping into the air in their attempts to pass up turbulent waters. The only practicable way to capture them while so engaged is to dip blindly into the roily water with a long-handled dip-net. This is not as difficult as might be imagined for such is their abundance during the height of the run that one may be brought up every few dips and not infrequently two or even three at a time. When the dam is overflowing it is more simple to capture them as one may walk along the base of it and slip a net under them as they adhere to the sloping boards.

This year the lampreys put in their appearance on March 28, and were last

seen on May 20. The greatest numbers were seen on May 8.¹ Generally, however, the season may be said to extend from about the middle of March to the middle of May with its peak in the latter part of April. The maximum size obtained had a length of thirty-three inches and a weight of two pounds, four ounces, while the minimum was twenty-four inches long and weighed fourteen ounces. The average was twenty-nine inches with a weight of one pound, eleven ounces.

There is of course considerable individual variation in the weight at a given length, dependent upon plumpness, general condition,

and so on, but it may be roughly said that in ripe lampreys over two feet long, a little in excess of two ounces is added for each inch in length. Correlation with sex in this respect is practically negligible.

As before noted, these animals are not provided with jaws but while swimming and forcing

¹I am indebted to Mr. W. Bennett, an enthusiastic woodsman of Redbank for these dates, as well as for valuable guidance about this territory.



CATCHING LAMPREYS

Method by which the ninety-eight lampreys were captured. Dam and flume appear in the background.

Photograph by C. M. Breder, Jr.

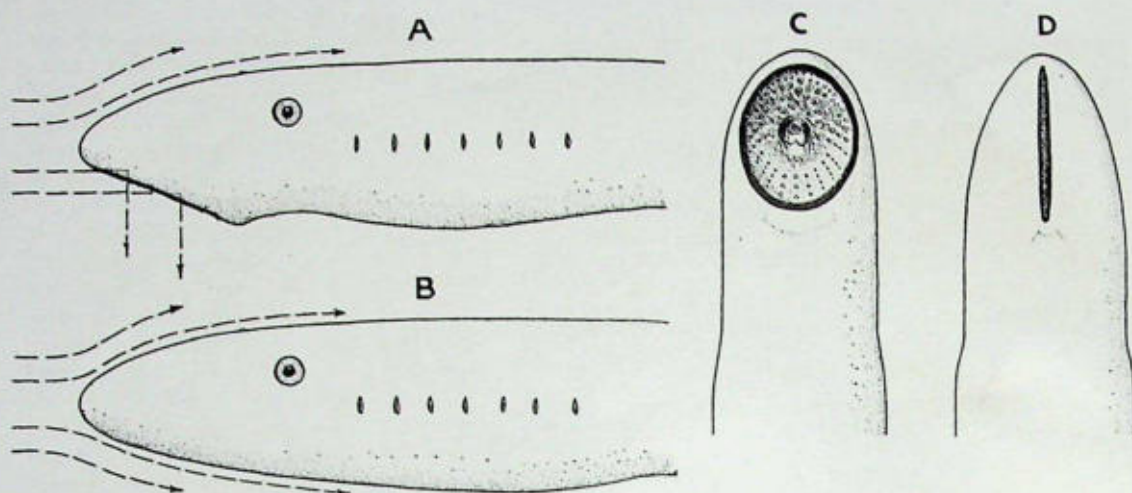


DIAGRAM ILLUSTRATING THE REASON FOR LAMPREYS CLOSING THE MOUTH WHILE SWIMMING

A—Head of a swimming lamprey with mouth open indicating how water below the axis of the body would be deflected downwards from the mouth, thereby forcing the head up. B—Head of a swimming lamprey with the mouth closed indicating how the water both below as well as that above the axis of the body would be parted without any deflecting effect. C—Ventral view of the head of a lamprey with the mouth open. D—Ventral view of the head of a lamprey with the mouth closed.

a passage through weeds and debris they fold the suctorial disc together upon itself from side to side which makes the entrance portion of the animal regularly conic in shape, thus greatly reducing hindrance to forward motion. If this were not done the concave buccal cavity would offer considerable resistance to forward movement and would tend to deflect the head upward. As these animals possess no paired fins at all it is obvious that they would encounter some difficulty in offsetting this upward deflection by means of their sinuous body movements alone. It is clear that by closing the mouth in this manner that a considerable economy in muscular effort is obtained.

Lampreys are considered a nuisance by local fishermen who know them as lampers, lamper-eels, lamp-eels, suck-eels, suckers and so forth. Many believe them to be poisonous, some even refusing to touch them with the bare hand. Only one was located who ever ate them and he claimed to do so quite regularly—a Japanese chef with fishing proclivities. In contrast to this, in other places they are frequently highly esteemed as a delicacy and according to accounts, formerly at least, great numbers were salted annually in New England. About the time the lampreys run, river herrings put in their appearance.

These draw a considerable number of local fishermen who take them in gill nets or in dip nets by the same operations that serve to catch lampreys. Occasionally a shad is caught, although now they are quite scarce. Suckers (*Catostomus commersonii*) and chub suckers (*Erimyzon succetta oblongus*) are common and much sought for as there is a local dealer who offers fifteen cents a pound for them! In addition to the above, the following fishes are commonly taken near the dam: eels, yellow perch, carp, pickerel, common and blue-gill sunfish, and catfish. The following species according to reliable sources are occasionally met with at this place: large and small mouthed black bass rainbow and brook trout and white perch. Several species of minnows are common and form the basic diet of many of the larger forms. Large snapping turtles are common and, together with bull frogs, form a source of some slight revenue for certain of the natives energetic enough to go after them.

Taken as a whole this point on the Swimming River is an altogether enjoyable place to spend a few days. It is quiet and pleasing to the eye, but fortunately lacks that scenic beauty which draws great crowds whose very presence would nullify its simple charm.



SEA BASS AND TAUTOG
Two good food fishes of New York waters.
Photograph by Elwin R. Sanborn.

FISHING FOR LAKE TROUT IN THE
GEORGIAN BAY

By A. E. ARGUE
Tobermory, Ontario.*

THE line used in trolling for lake trout in shallow water in the Georgian Bay is about twenty fathoms long. It is used with two, three or four two-ounce leads, spaced about two fathoms apart. Four of these leads will put the line down about fourteen feet. The trolling spoon is about six inches long and fitted with fins at the end to make it revolve. The amount of bend in the fins is determined by the speed of the boat. Below the troll is a three pronged hook which is usually baited with lake herring or sucker, tied on with fine string or thread. Artificial baits are sometimes used on the hook. I have taken fish without any bait but prefer a piece of fresh sucker which is tougher than herring and good for a number of fish. A piece of clean rag is preferable to a stale bait. One could troll all day with a tainted bait and not get a bite, and then remove the bait and put on a piece of clean rag and catch the fish on the same ground.

The size of the trout caught vary with the time of the year and the locality where they are taken. Trout caught by trolling are better flavored than those taken in nets as the trolled fish is killed immediately and retains its flavor.

The weight of the trout taken by trolling varies from one to forty or more pounds. A twenty-five pound fish is about the limit to land with a troll as with larger fish the hook usually pulls out when the fish is being hauled into the boat. A good afternoon's sport would be about seven fish averaging eight pounds apiece. I have trolled all day without success while on another day have taken a dozen. I have known the men who make a living by trolling to catch 150 pounds in a single day. The lake trout move in schools presumably after lake herring which is their main food and the fish in a school are usually of the same size. In winter when fishing through a hole in the ice it was noted that all the fish caught for a few days were small, then for a few days a larger size averaging about five pounds, then a still larger size for a few days more. At the same phase of the moon a month later the different sizes are

again caught in this way. The moon in its changes and the temperature of the water play a great part as to the depth of the water from which fish are taken. At the fall of the year during the spawning season the trout come into shallower water in great numbers. This is when the fishermen make their harvest and the winter supply usually depends upon the fish caught while they are on the shoals. Trout can be caught with the trolling line during the summer months away from the shore by using a line thirty or forty fathoms long with from fifteen to twenty leads spaced about nine feet apart. Thirty leads would put the line down about ten fathoms at a speed of three miles an hour which is a good speed for trolling. This kind of trolling is harder work and the catch more uncertain. The best time for trolling in this vicinity is from the first of May until the early part of July when the catch falls off. Trolling is again good when the fish are on the shoals in the months of October and November. During the same months one could have a good week's sport with casting rod and line on the shoals when the moon is full but the weather at this season is cold and uncertain.

Lake trout are also caught on trawl lines, the hook being baited with one-third of a herring cut diagonally, each herring making three baits. The hooks are attached to a small sized line about two feet in length, which in turn are attached to the long trawl line, the hooks being spaced about thirty-five feet apart, 1,200 hooks is the limit for any one fishing license. These trawls are usually set on the bottom of the lake with the exception of a couple of weeks in the month of June when the hooks are set near the surface on what is termed a floating line. This line being buoyed about every twenty hooks with a small cedar buoy, the line to which allows the trawl and hooks to float about thirty feet below the surface. The average catch for a trawl line is about a half pound per hook.

Another method of taking the lake trout is termed "bobbing" which is done in the winter time through holes cut in the ice and at a depth of fifteen to twenty fathoms. The hook is sunk with a lead sinker about three inches long and the hook is baited with a piece of fresh herring. The herring are taken in nets set under the ice. The hook is lowered to the bottom and moved up and down two or three feet which attracts the fish. When there is a bite the fishermen run away on the ice with the line until the fish is through the hole and out on the ice. The line often freezes stiff when it comes out of the water

* In the summer of 1921 the Director of the Aquarium while cruising in the Georgian Bay captured a number of large lake trout by trolling. The opportunity for this sport was afforded while a guest on the yacht of Mr. H. L. Gaddis of Detroit, a member of the New York Zoological Society. Mr. Argue, government wireless operator at Tobermory, who has had much experience in lake trout fishing kindly prepared this account of the methods employed by local fishermen.

but thaws when it is lowered again. If one attempted to pull in the line hand over hand it would probably mean the loss of the fish and the risk of a badly tangled frozen line. The good "bobber" can catch as much as eighty pounds in a day of five hours. The men sit on the ice under the lee of a wind-break consisting of sticks put together tepee fashion, and over which is spread an old blanket or piece of canvas. The supporting sticks are frozen into the ice and remain in use day after day. In fine weather the bobbing grounds look as though a company of soldiers were camped on it. The fishermen don't mind ten or twenty degrees below zero provided there is no wind, and they do not mind the wind provided it comes from the north. They then place the wind-break facing towards the sun and are quite comfortable. The ice varies from six inches to two feet in thickness and extends as far as the eye can reach. The hole is made about two feet square and the block of ice removed usually comes out in one piece which is used to sit on. A small hole is made nearby into which water is made to run and in which the bait is kept to prevent its freezing. The writer has enjoyed many an hour's bobbing and caught as many as seventenn fish in one day, the fish averaging from one and one-half to twenty pounds. Trout larger than twenty pounds are usually lost.

Another method of taking the trout in winter is by spearing. The hole cut in the ice is covered with a tent of dark material to keep out the light and make the fish more easily seen. An artificial herring is used to attract the trout and sometimes a live herring is lowered on a string and allowed to swim about. Trout attracted in this way are speared, the spear having a line attached to prevent its loss. When gill nets are used in the fall they are set in from one to four fathoms of water. A good haul would be about 200 pounds to the net which is usually about 600 feet long by five feet deep. The smallest mesh allowed is four and one-half inches which permits fish smaller than three pounds to pass through and escape. It is illegal to sell trout of less than one and one-half pounds in weight.

Shoal water net fishing commences in the full of the moon in the month of October when the fish are in shallow water. As the moon wanes the fish move gradually into deeper water. The same process is repeated during the month of November when the fish are again in shallow water during the full of the moon. In the middle of summer when the water is

warm the trout seeks the deeper and cooler waters. During the spawning season there are government officials on the larger fishing boats to save the spawn from the live fish, which is promptly fertilized and taken to the hatcheries, where the fry are cared for until they are returned to the lakes.

ITEMS OF INTEREST

Paintings of Fishes in the Aquarium.—Mr. Hashime Murayama has recently made paintings from life of several species of fresh water fishes in the New York Aquarium.

These paintings with a number of photographs by Mr. Elwin R. Sanborn and an article on fresh water fishes by Dr. C. H. Townsend will be published in the August number of the *National Geographic Magazine*.

Old Books on Fishes.—The Aquarium library has recently acquired three valuable old works on fishes—the gift of Mr. A. H. Olmsted of Newport, Rhode Island.

They include "The Natural History of British Fishes" by the English naturalist, E. Donovan (1802-4-8), five volumes in three books, bound in leather and handsomely illustrated with colored plates. Donovan wrote on birds, insects and shells, as well as on fishes, making a lasting name for himself in the field of zoology. Like Charles Darwin, he was enabled, through the inheritance of a fortune, to gratify his love of learning by extensive travel in his youth, collecting objects of natural history and making original studies of them.

The second is a copy of Gulielmi Rondeletii's famous old Latin work, "De Piscibus Marinis" (1554), which describes and pictures marine invertebrates, turtles and mammals, as well as fishes, real and legendary. The work displays remarkable scientific accuracy for a sixteenth century production.

The third is a copy of "De Historia Piscium" by Francis Willughby, 1686; a large volume bound in vellum. This work, also, is in Latin, and was published after the author's death by John Ray, his instructor and co-worker. The interesting legend "Sumptibus Samuel Pepys" appears on many of the plates. I. M. M.

Fishes from Florida.—A collection of tropical fishes for the Aquarium was made at Key West, Florida, in June, but the local conditions were of a most unsatisfactory nature, far more so than at any time the writer has collected at this point previously.



BUTTERFLY FISH (*CHAETODON OCELLATUS*)

The butterfly fish has a black band across the head.

Photograph by Elwin R. Sanborn.

For many days there was a dead calm which stopped all circulation of the almost landlocked little harbor so that the excessive heat caused the water to reach a hitherto unheard of record 91.4° Fahr. This made it most difficult to acclimatize the fishes that had been taken in deeper, moving water.

In spite of these adverse conditions, 856 specimens were landed at the New York Aquarium in good condition, embracing more than sixty species. Two of these are new to the Aquarium; one the bone-fish (*Albula vulpes*) much sought for by tropical anglers, proportionately much more gamey than the tarpon, although it rarely exceeds a length of three feet; the other (*Brachygenys chrysargyreus*) a very beautiful fish striped longitudinally with gold and silver. It is a close relative of the grunts (*Haemulidae*) and in general form resembles them. Among the rarer species included in the collection was a beautiful plum-colored parrot fish (*Pseudo-*

scarus plumbeus). A specimen of the round sting ray (*Urolophus jamaicensis*) two days after arrival gave birth to two young ones. These are so well developed at birth as to resemble the parent in all essential points.

An unusually fine collection of butterfly fishes, blue angels, French angels, Townsend's angel and golden grunts were also brought through successfully. The bulk of the collection consisted of the more common coral reef fishes such as morays, grunts, hog-fish, parrot fish, slippery dicks, beau-gregory, sergeant majors, snappers, surgeon-fish, puffers, hinds, groupers, Jewfish, nigger-fish, etc.

L. L. M.

Shipping Live Fishes to Market.—An innovation in the fish trade was made in June, 1923, when 6,000 pounds of live fishes from Lake Huron reached Fulton Market, New York City.

The fishes, consisting chiefly of large-sized lake trout, were taken in pound nets at Little



LAKE STURGEON (*ACIPENSER RUBICUNDUS*)

This specimen from Lake Huron is five feet long.
 Photograph by Elwin R. Sanborn.

Current, Ontario. They were transported by freight car in wooden tanks seven feet square and five feet deep, the water being kept in circulation by a kerosene-driven engine. The loss of fishes during transportation amounted to only fifteen per cent. and these being transferred to ice and sold, the loss was negligible.

A large concrete tank abundantly supplied with flowing water has been constructed in Fulton Market, in which the fishes are held until sold.

The idea in shipping live fishes to market is to deliver as perfect a product in New York as possible.

In addition to lake trout there were several other species of fishes including sturgeon and pike. The Aquarium took advantage of the opportunity to add a number of lake trout, sturgeon, catfish and large suckers to its collection of fishes from the Great Lakes. The lake sturgeons are the largest of this species ever received at the Aquarium, two of them exceeding five feet in length.

The weight of a sixty-one inch sturgeon was fifty-seven and a half pounds.

This shipment was proposed and managed by Mr. G. Friedrichs, who has already made large deliveries of live eels in New York. On one of his trips 165,000 pounds of live eels were brought from Quebec in specially constructed barges, which were towed through Lake Champlain and down the Hudson River. C. H. T.

PIRATE PERCHES

By IDA M. MELLE

DIFFICULT little fishes to favor in captivity, but interesting as any that come to our nets in local fresh waters, are the pirate perches (*Aphredoderus sayanus*). Despite their formidable name, the pirates are rather timid creatures as far as human beings are concerned, and real pigmies for North American waters, never exceeding five inches in length and rarely three.

It was their voraciousness that won them the

name of pirates, for, though feeding principally by night and upon small prey, as many fishes do, they have a strikingly robust appetite. In a state of nature, water insects constitute ninety per cent. of their food, to which a few crustaceans, aquatic worms and algae are added by way of variety. But in captivity, if their natural food is not provided and substitutes prove unsatisfactory, they are said to have no hesitation in gobbling any little minnow, roach, dace or shiner that happens to be at their mercy. At the New York Aquarium we have experienced no trouble with them in this respect.

The specimens now on exhibition in the Aquarium are the first shown in several years, though the species is found in lakes and streams from New York to Texas. They have a strong tendency to conceal themselves by day among the rocks or behind pebbles, plants and shells. Fishes with such tendencies as these, when placed with other species that forage by day, soon learn to change their habits. Otherwise by the time they are ready to feed under cover of darkness, none of the food thrown in during the day will remain for them.

Fishes are keen observers, and a wild specimen that would not eat for weeks after capture if left alone, will quickly take food when placed in a tank where tame fishes are feeding.

At first glance the pirates appear to be inky black, but they are really dark green suffused with black bars and spots.

By far the most interesting thing about them is their physiology, for as they grow older, a prolongation of the intestine takes place, and the vent gradually moves forward from its position behind the ventral fins until it comes to occupy a jugular position, i. e., just below the knob of the throat. This curious feature resulted originally in the naming of two separate species of pirates, though, as we now know, one was the young of the other. The name *Aphredoderus* refers to this physical peculiarity, which, though not unique among fishes, is exceedingly rare. As Jordan and Evermann interestingly express it, the pirate perches are "a relic of a lost fauna."

DOCTOR TENCH

By IDA M. MELLE

THE Aquarium received from Germany last winter a consignment of European tench, the gift of Mr. Heinrich Hagenbeck. These are the common tench, *Tinca tinca*, called Schleie in Germany. The shipment of 101

specimens arrived in excellent condition, although nearly three weeks elapsed before they would take food. Many were fishes of small size and none measures more than six inches in length.

The tench is referred to commonly in European literature, though not always favorably. As early as the fourth century, Ausonius, the Latin poet, called it "plebeian fish fare," and its chief economic value in the past was apparently a medicinal one, the fish having been used to make poultices. This strange practise no doubt arose from the belief that the fish healed wounds of other fishes, principally the pike. It was said that the tench would lick the wound of a pike and cure it of its injury. Hence the name "Dr. Tench." It was even imagined that the pike, because of the medical attention it received from the tench, would not eat its small benefactor. But this pleasant superstition was exploded by the discovery that the tench makes excellent bait in fishing for pike!

The body of the tench is more slimy than that of most fishes, and it is a stupid, sluggish creature, not infrequently caught in the hand while napping during the daytime. Only the tail appears to possess much sensitiveness, and the fish therefore fails to realize that it has been captured until it finds itself actually lifted out of the water, when, of course, struggling is in vain.

The natural food of tench consists of aquatic worms, insects and molluscs, together with a pond plant—one of the potamogetons—which they browse on so habitually that it is called tench weed. They also swallow considerable quantities of mud, from which they doubtless extract animal and vegetable substances. Tench are not known to eat other fishes.

They inhabit lakes and ponds, rivers and marshes—slow waters by preference—and are most tenacious of life, living a long time during summer droughts in the dried-up mud of ponds. Because of this tenacity it is related that in Europe, when tench are taken to market, those remaining unsold at the end of the day are returned to the water! On the other hand, a European tells us that by reason of the fish's mud-eating habits and its frequenting of sluggish waters, the custom is to place it in pure, running water for a time, to get it clean enough for consumption, and it is in this manner sold alive in the markets. Possibly it was to tench as taken uncleaned from the mud, that Ausonius referred.



A ROCK-POOL COLLECTION
Starfish, mussel, sea-anemone and killifish.
Photograph by Elwin R. Sanborn,



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FORK-TAILED GALAPAGOS GULLS. *CREAGRUS FURCATUS* (NÉBOUX)
On Tower Island large colonies of these gulls bred on the lava rocks, in the shelter of thorny cactus.

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GALAPAGOS REPTILES AND BIRDS IN THE ZOOLOGICAL PARK *

By WILLIAM BEEBE.

Photographs by William Beebe and John Tree-Van

AS a result of the Harrison Williams Galapagos Expedition seventy-seven living creatures were added to the collections of the New York Zoological Park. Two-thirds of these were captured in the Galapagos Islands, the remainder being caught or purchased at Panama or Colon. These historic islands are to-day in the age of reptiles, dominated from coast to mountain-top by lizards or tortoises as the most conspicuous and largest forms of life. But their reign is passing swiftly, and soon the islands will be almost as barren of reptile life as when their volcanic peaks first pushed up above the surface of the Pacific Ocean. With the exception of the tiny geckos which I found resting under bits of loose lava, I succeeded in bringing back living representatives of all the lizard groups.

Scarlet and black appeared to be the two outstanding colors of the fauna, and characterized the abundant *Tropidurus* lizards which scurried over the sand and lava, often running across our shoes or mounting to a point of vantage on the shoulders of some of their gigantic saurian relatives. The background color of their bodies is black and grey, with flaming scarlet on the heads and sides of the female. They are absurdly tame and investigated all our tents and luggage. When pursued they would stop and go through a great show of intimidation, nodding their heads up and down and expanding the throat pouch to its

fullest. They accepted confinement at once, spent the day catching flies or taking them from our fingers, and at night burrowed deeply beneath the sand.

These small active lizards, which were from four to eight inches in length, I found common on all the islands which I visited except Tower. Other explorers met them on all except the three northernmost islands, and have described seven well-marked species. The chief problem offered by this archipelago is whether it has always consisted of isolated volcanic islands and islets or whether at one time it was a single large land mass more or less closely connected with the Central American mainland. Every fact and factor which Prof. Wheeler and I were able to investigate pointed unquestionably to the latter theory. Ten years ago Van Denburgh, in his study of these lizards, was led to the definite conclusion, that "there formerly was a single large island inhabited by one species of *Tropidurus*; that through gradual and partial submersion this island became divided into the many islands of the present archipelago; that each island, after its separation, was occupied by those animals which inhabited it before; and that the present fauna of each island is directly descended from its original inhabitants."

As to the possibility of original and of redistribution of these lizards, twice I found *Tropidurus* which had crept into our rowboats on the beach, one of which escaped as we pushed off, and the second was on board when we reached the yacht. Again three of these

*Department of Tropical Research, Contribution No. 145.



LAND IGUANA. *CONOLOPHUS SUBCRISTATUS* (GRAY)

During the heat of the day, each cactus and each bush had its iguana, three or four feet long, crouched in the shade, and moving as the shadow moved.



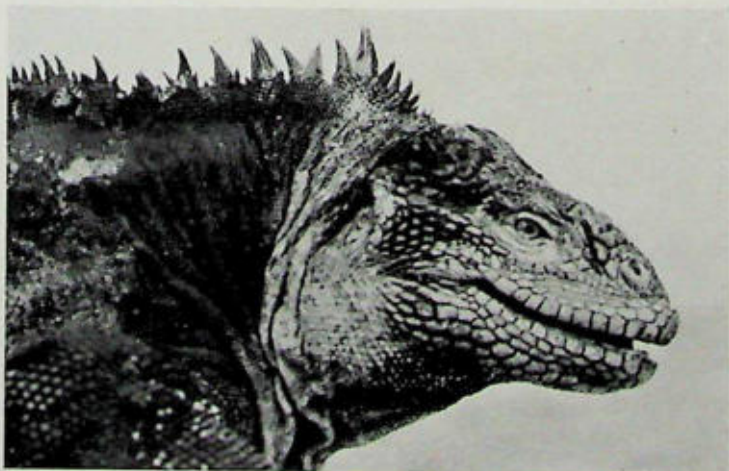
YOUNG FORK-TAILED GULL IN THE ZOOLOGICAL PARK
Creagra furcatus (Nelson)

lizards escaped from their cage on board, and two did not appear until twelve days later, when we were well north in the Atlantic Ocean. This would make their occasional transportation from island to island and from the mainland on floating tree-trunks a not impossible thing.

More than anything else, I looked forward to seeing the great black marine iguanas for which the Galapagos, ever since the time of Darwin's visit, has been famous. Miss Cooper saw the first one on the first day, and it came up to all expectations. As black and rugged as the lava boulders themselves, these splendid saurians crept about like great prehistoric monsters. They showed little or no fear of us, and often crawled up closely to see what we were about, and, indeed, one moving picture which we took shows one of them being gently stroked. We captured them by stalking and a sudden rush, or drove them into crevices too small to contain their tail, by which we hauled them forth. I discovered two very interesting things about them—they could not be made to bite, and they absolutely refused all food in captivity. Neither sudden fright nor teasing would induce them to use their small, but sharp teeth, and we came to handle them recklessly without fear of consequences. These *Amblyrhynchus*, or short-headed lizards as they are called, spent their entire lives close to the water's edge. During high tide

they kept in their burrows or sunned themselves on the black lava, but when the water began to recede they crawled slowly down and munched at the tufts of exposed sea-weed. They clambered about the rocks clinging tightly with their strong curved talons, in the face of heavy surf, and seldom took to the water of their own accord. But their long flattened tails were well adapted for natatory purposes, and their swimming and diving ability was equal to any emergency. On the last day, when we prepared for a big haul of *Amblyrhynchus*, I had a boat

cage made, a sloping wire screen on a small dinghy, which we towed to the beach where they abounded. Into this we placed them as fast as captured, and not only brought them to New York in it, but even carried it to the lawn party at the Zoological Park. From Indefatigable Island, one thousand miles out in the Pacific, to the Bronx, and for two months later these lizards lived and apparently thrived on salt water and air. No variety of sea-weed or terrestrial vegetable tempted them to break their fast. Individuals were killed from time to time as material for the big group to be built in the American Museum, but after one hundred days of complete abstinence from food the remainder appeared as active and as strong as when first taken from among their native lava.



HEAD OF GIANT LAND IGUANA.
Conolophus suberistatus (Gray)



GALAPAGOS PENGUIN. *SPHENISCUS MENDICULUS* (SUNDE.)

Galapagos Penguin which allowed itself to be caught in Tagus Cove, Albermarle.

We found hundreds of these picturesque lizards on various islands, but none of the vast hordes which were to be seen twenty years ago. They have almost no enemies of which we know, but they are slowly but certainly decreasing. No other living inhabitant of these islands seemed so thoroughly a part of its environment as *Amblyrhynchus*. In color, in rough contour, in the scales of its head standing up like volcanic cones, in its intimacy with lava and surf, it seemed an organic embodiment of the shores of these desert islands. Its swimming ability has enabled it to pass from island to island to such an extent that there are no separate insular forms, and perhaps its limited environment has also made for absence of variation. It has very remarkable power of orientation, as I proved on throwing an individual overboard when we were anchored two miles from land. It splashed into the water on the nearest land off the port bow, although the lava shore could hardly have been visible from the lizard's viewpoint, especially in the dim light of late afternoon. It made five long, deep dives before I could recapture it.

Very different, both in appearance and character, were the giant land iguanas, *Conolophus* by name, which I found living in burrows in

sandy uplands. Their haunts, as we studied them on Seymour Island, looked much like South African veldt—flat, open country, partly grassy, with isolated cactus and bursera trees. Here, during the heat of the day, every iguana lay in the shadow of a favorite bush or cactus plant, moving only to follow the narrow shadow as it shifted around, and here we walked slowly up to them, and after a quick race, seized them by the tail. Some were quite four feet in length and weighed twenty pounds, and in color were brilliant in comparison with their sombre marine cousins. The head and forelegs were bright cadmium or chrome yellow, the neck and throat whitish, and the body rich terracotta, variegated with black. To see these great parti-colored creatures awkwardly walking about beneath the spiny cactus over soft, red, volcanic mud with a background of rugged, bare craters, was to see the world in imagination, as much of it must have been millions of years before mankind began to possess and destroy.

By lucky accident of a *Conolophus* seizing one of our shoes and biting severely, we were probably saved from a more serious attack, for, unlike the lizards of the sea coast, these proved to be irritable and fierce and willing to do their best to win freedom with teeth as well as claws. Their fury spent, philosophy ruled, and they accepted what fate offered



MISS COOPER AND OUR BLACK SPIDER MONKEY "SINDBAD"

in the way of lettuce and cabbage from the ship's cold storage, with the result that a large colony is to-day living and thriving in the reptile house of the Zoological Park. They are rather closely related to the sea lizards, and the probability is that both are descended from a common ancestor which long ago migrated from the mainland.

The giant land tortoises which have given their name to the islands have played a prominent part in the relation of mankind to this archipelago. From the time of the earliest buccaneers on through the era of whalers and of the privateers of 1812, the Galapagos have been a rendezvous where fresh meat might be had for the picking. Hundreds and thousands of the unfortunate creatures have been carried off in the holds of vessels, serving actually as living ballast, and affording a daily supply of food for many months. Now these land tortoises have been reduced to a mere scattering of individuals, far back in the interior and in the bottom of steep-walled craters. The fully adults gone, the young



FEMALE GROUND LIZARD

These were golden-brown, with face and sides of the body a flaming scarlet.

are breeding with lowered vitality, and wild dogs and pigs on many islands are ever waiting the chance to snap up eggs or newly-emerged young. We succeeded in finding but a single specimen, in the depth of a crater on Duncan Island, and, like those which other expeditions have taken from this island, it was short-lived, and died within two weeks after capture.

I was able, however, to settle an interesting fact about which there has been much controversy — the swimming ability of these chelonians. It was known that they could float, but a tortoise helplessly drifting about would hardly account for the original populating of these islands. When placed in the water alongside the ship, with a full knot current running, our tortoise floated buoyantly, looked about in various directions, lowered its head well under water and gazed around, then deliberately turned and swam across the current toward the yacht. Failing to get a grip on the sheer side of the ship, it turned and went with the current to the gangway, which it



MALE GALAPAGOS LIZARD. *TROPIDURUS ALBEMARLENSIS*. BAUR

These very active little ground lizards were very abundant. They fed upon grasshoppers and were in turn devoured by hawks and owls.



GIANT MARINE IGUANA. *AMBLYRHYNCHUS CRISTATUS*. BELL.

In rugged outline and in color these iguanas resembled the lava upon which they lived. Unlike the land iguanas they never offered to bite.



BLACK-EARED GALAPAGOS MOCKINGBIRD, *NESOMIMUS MELANOTIS* (GOULD) IN THE IMMATURE PLUMAGE WITH SPOTTED BREAST.

So tame were these birds that they sang within arm's length.

was equally unable to surmount. It then turned and swam against the current toward the row-boat from which I had launched it. I tried this experiment several times with similar results. The creature floated high and showed no oscillation due to breathing, and with the average longevity of these animals it could have covered almost any number of miles if forced to do so, either across or against any ordinary current.

The song-bird of the Galapagos is a mockingbird, peculiar to these islands. Its character illustrates the effect of man's absence, and no sooner had we landed than several flew out on the sand to examine us, wholly without fear. Every now and then they would fly up to a thorny twig and give vent to delicious outbursts of typical mocker medley, sweet and harsh notes intermingled. Those living in the Zoological Park were caught without trouble. For a crumb they would alight on

our nets or guns, and pay with another song. The little doves, with their dull, wine-colored bodies and whitish wings, were less familiar. They had perhaps learned a little wisdom since the time of Dampier, when they would alight on the hats and arms of the sailors and in return were knocked down by scores. Both the mockingbirds and the doves which I brought home are feeding well and are apparently happy in their aviary.

The hawks were so tame that we could sometimes touch them with a hand or a stick, and the one which we brought home alive was knocked over by my artist, who, while painting at his easel, was so bothered by the bird that he threw a stick at

it in sheer exasperation, stunned it, and it is now in perfect condition.

Gulls, Penguins and Cormorants were the three remaining species which we captured and brought to the Zoological Park alive. Three downy, nestling Fork-tailed Galapagos Gulls (*Creagrus furcatus*) were picked up at



A FIFTY POUND GALAPAGOS LAND TORTOISE.

The tortoise easily swam against the current in twenty fathoms of water.



LAND TORTOISE. *TESTUDO EPHIPIUM* (GUNTHER)

Mr. Robert McKay found this tortoise in a crater on Duncan Island.

the last minute and added to the collection over which Miss Rose held jurisdiction. On three meals of chopped-up fish a day they thrived, and at present are in full juvenile plumage. When adult they are exquisite in gull grey, black, and white, with a striking scarlet line about the eye.

The smallest penguins in the world and those farthest north were ladled out of a cave

in Tagus Cove one morning by James Curtis and carried to the deck of the "Noma." Never had they seen human beings before, but they walked courageously up to us and took fish with as much enthusiasm and lack of fear as if hand-feeding on a steam yacht had been their daily routine since birth. They are the jolliest of little companions, and their serious Charlie Chaplin walk is the most amusing thing in the world of birds.



HARRISON COVE

The Cove is on the north-west shore of Indefatigable Island.



DEPARTMENT OF
TROPICAL RESEARCH
OF THE
ZOOLOGICAL SOCIETY



Contribution, Number 146.

A NEW VENEZUELAN COLLECTION*

By WILLIAM BEEBE.

ONE of the joys of a scientific explorer is the hospitality and whole-hearted kindness which is encountered everywhere in out-of-the-way places. Far more rare is the fulfillment of promises to collect and send specimens after one has left. It is only human nature to lose interest, especially when one is busy in another field of work. Mr. Rupert Legge, Superintendent of the Barber Asphalt Company at the Pitch Lake in Venezuela, is one of those men, so capable that he can carry on his own responsibilities and at the same time gather a very worth-while collection of living birds, mammals and reptiles. After leaving the Tropical Research Station in British Guiana a year ago I and my staff spent a month in Venezuela as the guests of Mr. Paul Muñoz and the Barber Asphalt

*Department of Tropical Research, Contribution No. 146.

Breeding of the Gibbon in Captivity.—Instances of the breeding of the higher apes in captivity are sufficiently rare to make the following worthy of record. It has just come to me in the "Journal of the Natural History Society of Siam."

Mr. A. W. Ogilvie writes that in April, 1914, he turned loose in his compound at Prae, North Siam, five Siamese Gibbons (*Hylobates lar*), two whites and three black. As one of the black ones shortly became savage, it had to be shot. The others lived together in peace and in May, 1920, one of the white ones gave birth to a young one. The father was one of the black gibbons, and the two remained constantly associated together. They chased the remaining two from the trees in which they were accustomed to spend their time, and did not allow them to enter the compound after the birth of the young one.

In September, 1922, the young gibbon, although over two years old and quite able to

Company, and since then Mr. Legge has assembled the following forty-seven living creatures, which he has just sent on one of the company's own steamers and which are now on exhibition at the New York Zoological Park. There are seven mammals, eight birds, thirty-one reptiles and one fish, as follows:

1	Pileated Tinamou	.....	<i>Crypturus soui soui</i>
2	Red-underwing Doves	.....	<i>Leptoptila rufaxilla</i>
2	Chachalacas	.....	<i>Ortalis ruficauda</i>
2	Sun Bitterns	.....	<i>Eurypyga helias</i>
1	Large-billed Hawk	.....	<i>Rupornis magnirostris magnirostris</i>
2	Ring-necked Monkeys	.....	<i>Cebus capucinus</i>
1	Puma	.....	<i>Puma concolor concolor</i>
1	Striped-tail Dog	.....	<i>Urocyon eurostictus</i>
2	Prehensile-tailed Porcupines	.....	<i>Coendou prehensilis</i>
1	Paca	.....	<i>Agouti paca paca</i>
1	Mata-mata Turtle	.....	<i>Chelys fimbriata</i>
6	Caimans	.....	<i>Caiman sclerops</i>
1	Tree Boa	.....	<i>Corallus cookii</i>
17	Boa constrictors	.....	<i>Boa constrictor</i>
1	Anaconda	.....	<i>Eunectes murinus</i>
2	Land tortoises	.....	<i>Testudo tabulata</i>
2	Soft-shelled Turtle	.....	.....
1	Electric Eel	.....	<i>Electrophorus electricus</i>

Of especial interest is the large mata-mata turtle, the electric eel, the tinamou and the striped-tail dog.

take care of itself, still clung to the mother whenever she swung rapidly from tree to tree, was still nursed by her and has never been seen to take any solid food.—*William Beebe.*

The Business Woman's Badge of Gentility.—It is to be "a proper fur piece." It was so decided on September 6, in connection with the coming fashion show for business women. The New York League for Business and Professional Women is staging the show, and what it says goes. But really is this a new idea? Decidedly it is not. For at least five years, fur, or a "fur piece," be it ever so humble, has been the badge of gentility of every New York woman who has been physically able to set foot beyond her own threshold. It may be black fox, or mink, or polyglot "seal," or "muskrat," or skunk, 'coon or 'possum, but the fur badge has been there. And as between the cheapest of fur and the best of wool, there are those who hold that the wool has the best of the argument.

New York Zoological Society



OBJECTS OF THE SOCIETY

☞ A PUBLIC ZOOLOGICAL PARK. ☞ A PUBLIC AQUARIUM. ☞ THE PRESERVATION OF OUR NATIVE ANIMALS. ☞ THE PROMOTION OF ZOOLOGY.

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Birds	Reptiles
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WILLIAM BEBE.

Director of Tropical Research and Honorary Curator, Birds

Each author is responsible for the scientific accuracy and the proof reading of his contribution.

VOL. XXVI SEPTEMBER, 1923 No. 5

FOUNDING THE NATIONAL ZOOLOGICAL PARK OF MEXICO

By WILLIAM T. HORNADAY.

The first real menagerie of miscellaneous wild animals ever brought together in the western hemisphere, so far as historic records avail us, was that of the enlightened Aztec, King Montezuma, and its abiding place was the ancient capital of Mexico, known as Anahuac. Indeed, if speaking legally, "according to the best of our information and belief," we might go farther and say that it antedated by more than two centuries the founding of the first zoological garden nucleus in Europe, which was at Paris, and known as the Jardine du Roi, born about 1792.

This is the description of historian De Solis (1724) of the zoo that Cortez found in the environs of Montezuma's palace, where the great American bison was first seen by Europeans.

"In the second Square of the same House were the Wild Beasts, which were either pres-

ents to Montezuma or taken by his Hunters, in strong Cages of Timber, rang'd in good Order, and under Cover; Lions, Tygers, Bears and all others of the savage kind which New-Spain produced; among which the greatest Rarity was the Mexican Bull; a wonderful composition of divers Animals. It has crooked Shoulders, with a Hunch on its Back like a Camel; its Flanks dry, its Tail large, and its Neck covered with Hair like a Lion. It is cloven footed; its Head armed like that of a Bull, which it resembles in Fierceness, with no less strength and Agility."

On July 6, 1923, with solemn and appropriate ceremony, there was laid in the Park of Chapultepec, City of Mexico, the first stone of the new National Zoological Park of the Republic of Mexico. And here do we record once more the fact that in the building of cities, states and nations the creation of a real zoological park or garden represents the high water mark of enlightenment and progress.

In November, 1915, the Constitutionalist Government of Mexico announced that it had established in the Department of Fomento "a very important institution named the Institute of Biological Studies," consisting of three departments. These were:

- I. The Institute of General and Medical Biology.
- II. The National Museum of National History, and
- III. The Administrative Section.

To the National Museum was assigned the duty of creating a zoological garden and aquarium, and a botanical garden. After long and careful studies of the whole question, culminating in the preparation and adoption of an excellent general plan of development, the cornerstone of the new National Zoological Park and Aquarium of the Republic of Mexico was well and truly laid on July 6, 1923, in the presence of an assemblage of government officials and citizens specially interested in the new development. The ceremony took place under the direction of Senor Ing. Joaquin P. Córdova, Assistant Secretary, as the official representative of Senor Don Ramon P. de Negri, Secretary of Agriculture and Fomento.

That ceremony, however, relates solely to the development of the *new* institution, on an appropriate and ample site in the Forest Park of Chapultepec, which will also contain in close proximity the Aquarium and Botanical Garden.

The presiding genius of the Department of Biological Studies is its Director, Professor



LAYING THE CORNERSTONE OF THE MEXICAN NATIONAL ZOOLOGICAL PARK

Forest Park of Chapultepec, July 6, 1923.

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PERSONAGES PRESENT AT THE LAYING OF THE CORNERSTONE OF THE MEXICAN NATIONAL ZOOLOGICAL PARK

1.—Sr. Prof. Alfonso L. Herrera, Director de Estudios Biológicos. 2.—Sr. Alfredo Duplán. 3.—Sr. Gustavo Roviroso. 4.—Sr. Ing. Joaquin Pedrero Córdova, Oficial Mayor de la Secretaría de Agricultura y Fomento. 5.—Sr. F. J. Córdova y Gurria.

Alfonso L. Herrera, a man of whom Mexico may well be proud. For more years than we can determine he has been the foremost biologist of Mexico, a perpetual student, an industrious investigator, and a fruitful author of scientific books and papers. With this foundation of industry and accomplishments, Prof. Herrera has been tireless in promoting the development of institutions for the practical biological education of the Mexican people. It has been the good fortune of very few scientific men to have been instrumental in the founding and developing of a Museum of Natural History, a Zoological Park, an Aquarium and a Botanical Garden; yet that has been the privilege of this Director.

We have seen Director Herrera in the field at work, and we know something of his industry and his methods. In the hot August of 1922 he appeared in New York and spent a week studying the Zoological Park. We have seen many men engaged in that task, but only one other who worked with such exhausting diligence and thoroughness as he. His only equal was Dr. G. Loisel, of France; but if we may include "present company" we will add to those two the Director of the New York Zoological Park, who in 1896 went through the best zoological gardens of Europe as they worked here.

At the end of a month spent in New York in 1922, Professor Herrera was visibly close to the point of complete exhaustion.

Naturally it is a pleasure to work with a man who toils at his tasks in the Herrera way. As a much desired addition to the National Zoological Park of Mexico, the United States Department of Agriculture and the New York Zoological Society have now joined in making a gift to that new institution consisting of three American bison, a male and two females, which will be shipped from the Wichita National Bison Range at some convenient date in October.

The interest and enthusiasm of several of the high officers of the Mexican Government in promoting the enterprises of the Department of Biological Studies is worthy of the highest praise. Foremost of all stands President Obregon himself, who among other acts to be expected, last year, in September, surprised and delighted the zoologists of New York by suddenly proclaiming ten-year close seasons on all the mountain sheep and antelope of Mexico, and perpetual protection of the elephant seals and other wild life of the

Guadalupe Islands. To that there has just now been added five years of close season for the deer of Cedros Island and the west coast of Lower California. For these fine measures the trustees of the Permanent Wild Life Protection Fund bestowed upon President Obregon and upon Professor Herrera its gold medal "for distinguished services to wild life."

Senor Don Ramon P. de Negri, Secretary of the Department of Agriculture and Fomento, is a diligent supporter and promoter of all the Biological Studies and wild life protection measures of Mexico. Senor Carlos Lomez has recently been appointed Chief of the Division of Hunting and Game Protection, a position apparently parallel to that of an American Commissioner of Conservation. From Senor Lopez many important activities are to be expected during the coming years for the saving and the proper utilization of the valuable wild life of Mexico.

In the division of Fish and Fisheries we find that Professor Carlos Cuesta Terron curator of fishes and reptiles, National Museum; Professor José M. Gallegos, explorer, and Senor Enrique Gonzalez, inspector, have been very active and enterprising and wide awake to the needs of the fishery industries of Mexico. It is reasonably certain that they had much to do with the saving of the last herd of elephant seals on Guadalupe.

PROTECTION OF MEXICAN BIG GAME

FOR the enforcement of President Obregon's decrees giving ten years of protection to all the mountain sheep and prong-horned antelope of Mexico, the Department of Agriculture and Fomento has very recently appointed Ben. H. Tinker, of Tucson, Arizona, to the newly-created position of honorary game guardian, for services in northwestern Sonora. Mr. Tinker knows the sheep country of Mexico the best of all living men, and he will patrol the international boundary and the haunts of the sheep and antelope southward thereof with the aid of both an automobile and a pack outfit. Of course, he is empowered to make arrests in the field and to call upon all Mexican civil officials for assistance in bringing lawbreakers to justice.

At present the expense of this guardianship, which it is believed will be thoroughly effective, will be borne by the Permanent Wild Life Protection Fund.



THE "LAUGHING" HYENA—SPOTTED HYENA

I never had believed in the laugh of the hyena until I had observed this one and heard his weird and truly nerve racking cry. Just at sundown when the long evening shadows creep over the Park, the hyena breaks the twilight silence with his uncanny "laugh." He seems to select the moment when the hideous quality of the sound will produce the most thrilling effect; a pronouncement of the formidable howl that the possessor of so horrible a voice could effect. Even as the sound is thrilling, so is the hideous curling of his lips, which is nothing less than a frightful grin. To the eye and to the ear, the hyena is a formidable mammal.—*E. R. S.*

Photograph by Elwin R. Sanborn.

MY ANIMAL FRIENDS

By HELEN KELLER

PART I

MY ACQUAINTANCE WITH DOMESTIC ANIMALS

I CANNOT remember a time in my life when animals and I were not the best of friends.

I emerged from babyhood clinging frantically to the rough coat of my father's favorite hunting dog, a beautiful Llewellyn setter. Together Belle and I explored the garden. Together we fought our way through box hedges and rose trees. I am sure Belle was often puzzled to account for my peculiarities. She would watch me fall over objects with a troubled expression in her kind eyes. With remarkable intelligence she did her best to keep me out of trouble. She knew perfectly well that rose bushes have thorns, and that thorns scratch children and tear their frocks. She would push and pull in her efforts to dissuade me from going where it was not safe, but when I persisted, despite her most energetic resistance, she

gave in and faithfully kept her place at my side, poking out her head in front to take observations and prevent, if possible, a bump or a tumble.

I loved Belle dearly. She was almost human in her patience and forbearance with me when I was only a little savage, more ignorant and apparently less capable of learning than my faithful companion in the great darkness.

No sooner had I learned to spell a word on my fingers than I was seized with the idea of imparting this new accomplishment to Belle. I found her asleep on the shady side of the piazza. I sat down beside her and began to manipulate her blunt toes. She seemed embarrassed, she smelt her feet anxiously and whimpered a little resentfully. I kept on, determined to teach her to make the letters d-o-l-l. Realizing that further objection would be useless, she watched the performance with stolid

indifference, as much as to say, "Do as you please, but I'd like to see any one teach me to spell!" Poor Belle, I grew angry at her clumsiness, and pulled her toes so hard that at last she howled. But she bore me no malice, and was ready to play with me as soon as I had varied of the lesson.

I was fortunate enough to be born on a southern farm, and I grew up among a multitude of domestic animals. It is no exaggeration to say that I spent the greater part of the years before my education began in the company of my barnyard contemporaries. My keen interest in everything that had life led my teacher to use the animals on the farm as object lessons. I absorbed language satisfying my curiosity about living creatures. Hunting for the guinea hens' hidden nests, touching the cool, moist noses and threatening horns of the cows, holding the young pigs in my arms, feeding the great, strutting turkeys and feeling their feathers rise, like a flock of birds hovering close to the ground, being held on the back of a mule by one of the darky farmers when he ploughed the cornfield,—all these experiences imparted the liveliest reality to the words I learned. As I zigzagged my way from the kitchen door to the paddock at the end of the lane, I drank in knowledge with delight. I had a miscellany of small pets. One of them was a racoon, a plump little rascal. He was inquisitive and acquisitive. He had no principles to speak of. The family called him a thief and a nuisance, but to me he was a darling.

I had no end of rabbits, but they did not interest me greatly. They never once had a thought in their wee heads; nothing but downy fur, long ears and wobbly noses.

I recall with creeping thrills of agreeable horror an experience I once had with a magnificent Angora cat. He was sleeping quietly on my knee when something startled him. He stood up humping his back, angrily stretching his body, tensely alert, waiting to leap. His throat began to palpitate. Hungrily, stealthily he reached out one paw. An electric flame seemed to pass through his silken fur. I guessed he saw a bird through the open window. I tried to hold him back, but he darted out of the window like a thought charged with evil intent. I could not see what happened with my physical eyes, but the mental picture I had of the dénouement still grieves my soul. In that moment a thing of joy and beauty was snatched from the earth, a lovely voice was stilled, and happy wings ceased to soar in the sunlight. The incident has

always been to me a symbol of the ageless tragedy of life.

I had many bird friends,—pretty elves that opened many of the unseen gates of Fairyland for me. A flock of pigeons came to the dining-room window every morning for crumbs. They nudged and elbowed each other for standing room on the sill, cooing softly. Three of them became so friendly, they would take bits of muffin from my lips and fight each other for a place on my shoulder or wrist.

A pair of red bantams was the delight of my heart. They were so tame, they would stand on my knees billing and crowing, as much at home as if they were on the ground. One day the lady bantam most amazingly laid an egg in my lap.

One of my feathered flock was a cockatoo which Dr. Alexander Graham Bell gave me for a birthday present. I called him Jonquil because he had a glorious yellow crest which, unfurled, was a sign of wrath. Jonquil was a wicked elf, a menace masked in white and gold feathers. There was no limit or bound to his perversity. He would sit perched on my foot while I read, rocking back and forth as I turned the pages. Every few minutes he would hop up on my shoulder, kiss my ear and cheek, and put his long, sharp, hooked bill in my mouth, a token of his affection which sent tiny ripples of terror down my spine. Suddenly he would dart off screeching fiendishly, to alight on the back of a dog, or any human being who came near. So my happiness in his adoration was not unmixed with fear and dismay. Because of his countless misdemeanors, I had to let him go. My father tried to give him to various people, but Jonquil's evil fame had spread far and wide, and every one declined the gift with thanks. Finally he was given shelter in a saloon, where he acted as a sort of special policeman. Whenever a person became intoxicated or otherwise objectionable, Jonquil drove him out into the street. I do not know what became of him after the passing of the Eighteenth Amendment. Possibly he became the mascot of the Anti-Saloon League.

Then there was a canary which would sit on my finger and sing as if his little heart would burst in a flame of song. People often express surprise that I have such a tender feeling for birds. It is true, I cannot see them winging their way through the light, or hear their love calls in the spring-time. Nevertheless, to me they are part of life's dear intimacies. Their delicate endearments, when one is fortunate enough to win their confidence, are like the fragrance of flowers received from a beloved



MISS KELLER AND THE GIRAFFES

Miss Keller has a vast knowledge which embraces many lines of thought; thoughts of birds, insects, flowers, animals, books and men. She seemed to know the bears, monkeys, lions, deer—in fact anything with which she came in contact—as we know them; they did not seem strange, unsolved forms. But the giraffes were a puzzle, and her rapt expression in the photograph was the first evidence that she gave of bewilderment. Her thoughts were pictured by the lens of the camera and her expression affords a beautiful illustration of the marvelous mechanism of her brain struggling with this strange problem,—a brain tremendously more active than the average mortal's brain.—*E. R. S.*

Photograph by Elwin R. Sanborn.

hand. Although I may touch them seldom, yet I sense them as a sweet influence, a hovering presence like the air. In my thoughts they are one with everything beautiful,—sunlight, youth, spring blossoms and the laughter of little children.

When I was ten years old, Mr. William Wade of Oakmont, Pennsylvania, presented me with a beautiful pony. I had just read "Black Beauty," which had been put into raised print, and of course I named the pony Black Beauty. I learned afterwards that he was not black, but that did not matter a whit. Our negro cook's little girl's name was Lily, and nobody objected.

To this day I tremble when I recall Black Beauty's pranks. He knew that I could not see, and he took advantage of me in every imaginable way. When I was on his back, he did exactly as he pleased if some grown-up person was not near to discipline him. He would stop to eat grass by the roadside, or rear up on his hind legs to snatch a pear or an apple from a tree, nearly pitching me out of the saddle. Indeed, I stayed on only by clinging desperately to his mane. He seemed to think I was bent on breaking my neck, and he aided and abetted me to the utmost of his ingenuity. Nevertheless, we were great pals, and I loved him passionately.

Black Beauty was kept in a paddock, which was surrounded by a wire fence, and entered through a high gate. I would find my way to the gate with sugar, but I could not reach the bolt that secured it. Black Beauty was crazy for the sugar. He would sniff at it greedily, I would push my hand through the bars, and he would take the sugar and gallop away. One day I thought I would tease him. Every time he reached for the sugar, I pulled my hand back. He nosed the gate impatiently, stood up on his hind legs to bite the handle of the wooden bar, and finally jerked it up and down. He repeated this biting and jerking of the handle until the bar slid out, and the gate swung open. After that it was almost impossible to keep him in the paddock. His cleverness and initiative usually enabled him to find a way through almost any barricade.

I cannot leave the subject of my childhood pets without a word about Neddy, my wee donkey friend. I think he had lived many years before he came to me. At any rate he seemed to take life philosophically. He subdued himself to its restraints without protest. He was more interested in something to eat than in making progress. It made no difference to him how long it took to go from one point to

another, and sometimes he remained deaf to all entreaties to proceed. He viewed the birch switches we cut by the roadside unperturbed. I never knew him to harbor a feeling of resentment or to complain about anything. Sometimes I thought I detected a shade of dejection in the droop of his long ears when he saw a tomato can on the other side of a wire fence, obviously out of reach.

One day my baby sister was riding behind me on Neddy's back. Suddenly, in the middle of the muddy lane, Neddy made a queer, bucking movement with his hind legs, which caused the baby to slip off. I knew she was sprawling in the mud and yelling, but the donkey refused to stop, though I jerked the reins with all my strength. He held his head down and kept on his way resistless as fate itself.

Neddy was kept in the paddock with Black Beauty. He paid not the slightest attention to his handsome companion in captivity. Black Beauty, on the other hand, conceived a half-humorous contempt for Neddy. He would dash up to the donkey, give him a quick nip and gallop off to a distance, where he waited for another opportunity to steal upon his stolid victim. Only once in years did Neddy "get his Jim Crow up" to the fighting pitch. Then he made his heels felt in a way that Black Beauty did not soon forget. That one supreme kick made him a sadder and wiser pony.

To the grown-up mind it may seem a long way from a donkey to a butterfly, but to the eager mind of a child it may be but a single step, just as Wonderland seemed to Alice only a step from home. I imagine God is as much interested in that tiny being composed of one cell called the amoeba as in the kitten and the bird which have countless millions of cells to perform the various functions of their bodies. Even this speck of life is immortal in the scientific sense, for it will live as long as the earth continues to support life.

Nothing I learned about living things as a child excited my imagination so profoundly as the metamorphosis of a butterfly,—first an egg, then a caterpillar, then a motionless, mummy-like form, then a winged creature. I watched the process from day to day with delighted wonder. Never shall I forget the thrill of intense excitement that shot through my body when I found the cocoon empty, and the butterfly drying its wings on a bunch of trailing arbutus in the May sunshine! It looked at the great, bright world with the velvety eyes which adorned its wings, and seemed contented with its bed of flowers. I took it lightly on my palm,

and marvelled at the miracle that had taken place. Where were the clumsy feet and the horny jaws? There was no trace of them left. The delicate creature I held was made to tread on air and blossoms. Gone was the cutting, grinding mouth. Instead, there was a thread-like tube, coiled up like a watch spring, to be uncoiled and daintily thrust into a flower-cup to extract nectar. For a brief time this exquisite creature was one with joy and light and beauty. It could rise from the earth and sip the honey of flowers. In its glorified state it seemed almost to transcend physical existence.

PART II

MY ACQUAINTANCE WITH ZOOLOGICAL PARK ANIMALS

On my first visit to Boston, soon after my eighth birthday, I was taken to a menagerie, and formally introduced to an elephant, a cageful of monkeys and three baby lions. The monkeys were very mischievous. They pulled my hair and snatched at the flowers in my hat. Their queer, cold hands made me shiver, and I did not



like their teasing antics a bit.

The elephant was an enormous fellow with a breath like the blast from a furnace. He helped himself to a bag of peanuts I held in my hand, and swallowed them, bag

and all. When I tried to feel his trunk, he objected and lifted it out of reach. His keeper assisted me to climb up on Jumbo's back, where I sat frightened, but proud of the adventure. I felt like a little boat afloat upon a great sea, and secretly I was glad to climb back to the firm earth again.

The young lions were docile and playful. They rolled over on their backs and purred like kittens. I could not believe they would grow up into ferocious beasts of prey. But when I saw two of them years later, I was convinced. As I stood by their cage, I realized that my innocent, pretty, good-natured lion kittens had undergone a great change, not only in their physical appearance, but also in mind and disposition. The lioness was still slender, and more quiet than the male, which had developed into a powerful, aggressive creature with an imposing mane. His baby purr was now a roar that terrified me. I was not permitted to touch him even through the bars.

I have, however, touched two grown lions since then, also Trilby, the famous lioness in the Washington Zoological Park. She was as gentle and as beautiful as a great Dane. She pressed her body against me affectionately and licked my hand. One lion, a splendid fellow, held out a huge paw to me in a friendly manner, let me feel his great head and even growled amiably for my entertainment. His keeper



MISS KELLER STUDYING FORMS

She seemed to know the elephant, estimating the height very shrewdly, and was not the least startled when offered a snake and by mistake put her hand on its head. The ordinary person—a woman at least—would have screamed; not so Miss Keller—she evinced surprise very slightly.

made him walk up and down the cage so that I might feel his stride.

I cannot help thinking, however, that these noble creatures resent our timid familiarity. In the presence of the wild captives from jungle and forest I always sense the suppressed, fierce discord in the pipes of Pan. I know that the lion and the tiger have been snared from their natural environment into man's world. They submit themselves to the tyrant who walks upright, issues arbitrary commands and prohibits many pleasant things. They endure his laws and bear his yoke, but secretly they rebel, and when opportunity offers, they betray him. They never recognize his superiority or surrender themselves completely to his will. In their mysterious hearts they yield allegiance only to the primal laws of nature. They fear human beings and tolerate their caresses because they are afraid of punishment. Who has not observed the insolent bearing of the tiger toward the people who coddle him with words while fearing him even behind iron bars? Who has not sensed the distrustful bewilderment in the eyes of the deer, and even of the horse, which has for thousands of years responded to the lightest touch of man's hand! By dint of patience and intelligence man succeeds in trapping and confining the wild beasts of the earth, but they hear his voice only when he brings them food or threatens them. I suspect that if they once regained their liberty, all of them would take reprisals of him, and I am sure some of them would devour him without a prick of conscience. Hagenbeck says in his fascinating book on animals that to win the affection of wild animals is so rare a gift, it seems almost superhuman. The dog is the only animal in nature's annals which has made friends with man. Only the dog draws close to him and to some extent shares in his joys and sorrows. The dog, alone of the animal kingdom, acknowledges man's superiority and thinks only of being useful to him, lives only to serve him with unquestioning devotion.

All my life I have been interested in animals. Since my early childhood the circus has fascinated me. I have visited nearly all the important zoological parks and menageries in this country. I have made the acquaintance of African buffaloes, hippopotami, sea-lions, camels (and I wondered how any one ever thought of swallowing one!) I have touched a prairie wolf and a Colorado coyote. When I lived in Wrentham, Massachusetts, wild deer frequently ventured into our garden to eat lettuce and other vegetables. They had been

protected by law from hunters so long that they had almost lost their fear of man. I could never get close enough to touch them, but if I sat under the old apple tree at the end of the garden where it joined the hayfield, until they had finished their salad, I could feel their hoof-beats as they charged across the field into the woods beyond.

All these contacts with animal life have helped to make the world I live in real and vastly interesting. I am sorry for any one who has never known the sheer pleasure of meeting face to face a wild creature of the forest. There is a wealth of adventure in watching the drama of wild life that is always going on in the woods or in one of the zoological parks. When people I meet admit that they have never been to a "zoo," I am tempted to exclaim, "Is it possible that your city has gathered from the four quarters of the earth such a collection of wonders, and you have never seen them? Go at once to your zoological park, it will give you a variety of experiences you have missed. Besides, it is one of the most delightful means of gaining health of body and mind. A ramble in the park will renew your youth. The spring-tide of new life that flows through every path and green alley will bring a fresh thrill of life and love into your heart."

It was a visit to the Zoological Park of New York City that inspired the idea of this article. One day last summer I took my three little nieces from Alabama, who were visiting me, to see the animals. A blazing sun glared in the deep blue heavens, but the children did not mind that. Anyway, the Park was full of cool, shady spots where a great many people from the city sat indolently, enjoying their beautiful surroundings. For the three little southern girls there was an indefinable spirit of adventure in the air. (The Country of Children's Land is always full of surprises.) Pat, Mildred and Katharine were as full of suppressed excitement as Alice in Wonderland when she popped down the rabbit-hole, and they were as greedy to discover new worlds as Columbus himself. They did not fall into a Pool of Tears that I know of, they did not run a race with a lory, a dodo, an eaglet and a mouse, but the furry and feathered folk of the Park were just as magical. Their insatiate curiosity and outbursts of joy carried me back on the wings of memory to the time when I was more interested in the wild folk I met than in human beings.

Spellbound the children watched some seals gambolling in the water, climbing rocks, barking in the sunshine, tumbling off again and swim-

ming about, as happy as if they were off on a holiday, instead of at home, doing the same things every minute of their lives.

A solemn brown bear performed a clumsy dance for them; they laughed delightedly and clapped their hands. Then we were taken to the snake house, and the little girls played with a handsome Texas snake. He was most friendly and I felt him hiss softly with pleasure as he coiled round the warm body of the smallest child. There were many snakes, all interesting each after his fashion. The keeper, a fearless man wise in the ways of serpents, brought a rattlesnake for me to touch, grasping his head firmly in his strong hand, so that I might feel the rattle,—a sound terrible to all living creatures, yet sweet as waters in a desert to his mate when he calls her!

On our way to the monkey house we stopped to look at the strangest mammal imaginable, the Australian platypus,—the first one which had ever been brought to America alive.

It was in the water, and came near enough for me to touch its wet furry coat. This animal lives on a certain kind of worm which boys collect for him at a cost of



"A SOLEMN BROWN BEAR"

No doubt he was solemn, since Miss Keller seemed to sense mentally the things we do physically, and with about the same accuracy.

Photographs by Elwin R. Sanborn.

eight dollars per breakfast. Its nondescript appearance suggests that it is one of nature's discarded experiments. Or is it just a little joke?

One has the same feeling about the bat with his wings and head like a mouse, the armadillo with a turtle-like covering, the porcupine, so like a pin cushion, the anteater, a mammal with a bill, and the whale making believe he is a fish.

Windy, the great Orang-utang, received us with rough cordiality. She held out two hairy hands to us, and after looking me over critically she climbed into my lap and put her shaggy arms round my neck. The children were delighted, and danced about us with glee. All at once Windy caught sight of a rain coat hanging up in a corner, and she was after it like a shot. It was very amusing to watch her try to put the coat on. She struggled with it half an hour vainly. She pulled it over her head, tugging and twisting, but it never occurred to her to put her arms through the sleeves! At last she began to pant and scold furiously, tearing the coat to pieces in her wrath. Then she dropped it and dived under a table, obviously ashamed of her failure. However, when I took her hand and coaxed her to come with me, she smiled affably and marched beside me with heavy tread to face a camera, which she eyed suspiciously. But she submitted good-naturedly to the ordeal of being photographed. When we took leave of Windy, each one of the party shaking her two hands in turn, she smiled in a peculiar way. You know the kind of smile I mean, if you have ever watched

a hostess when her society friends tell her what a delightful affair it has been, and what a wonderful time they have had.

The next animals to entertain us were two giraffes. The children gazed at the strange, timid, sad-eyed creatures in speechless amazement. We fed them with biscuits, and they followed us about sighing softly. I wondered if it would make any difference to a giraffe whether his tea was strong or hot. I was sure that it would lose its strength and arrive in his stomach as iced tea, no matter how hot it started. We all thought the giraffes the saddest creatures under the sun. Perhaps they are sensitive about their shape,—poor things.

The climax of happiness came when we all climbed up on the massive back of Alice, the kindest of elephants, and she carried us round the ring, her long, swinging, heaving, pounding stride filling us with delicious anxiety. It took a good deal of persuasion to make the children dismount. They adored Alice. They wanted to pat her broad forehead, which she wrinkled thoughtfully when she looked at us. She took the bread we gave her indifferently, as much as to say, "I am not hungry, but I will eat it to show my appreciation of your kindness." She seemed to realize that I was different from the others. Elephants are very intelligent. I suppose Alice observed the uncertain movement of my hands. At any rate, she scrutinized me intently, and caressed my face, my shoulder and even my foot lightly with her trunk! Every one was surprised at her affectionate manner towards me, although they knew she was kindly disposed and trustworthy.

All too soon the time came for saying good-bye to the friends who had done so much to make our visit to the Zoological Park a memorable event in our lives. The children were very tired, but bubbling over with the joy of their discoveries.

"It's just like Noah's Ark," said one. "What a jolly time the animals must have had visiting one another!" exclaimed another. "I suppose they did, but really I wasn't there, you know," said Katherine, the eldest. "Perhaps the little animals were frightened when the lions and bears thought about their supper," suggested the youngest child. "I like the Zoo better than the circus because the animals look so happy in their pretty houses," declared Pat, "and besides, it's more fun than all the rest of New York put together."

As the children chattered, I realized as never before what an important part of the educational system of New York the Zoological Park is. It is crammed with instruction and entertainment for young and old. For the city child it is the very breath of the woods. There he may observe animals gathered from all over the world. There he may study, not only what is going on at the present day, but also what has been evolved through vast periods of time. There the thoughtful catch glimpses of the immensity and wonder of life which lie close to our feeble senses unapprehended. It stimulates a desire for knowledge, it fosters an inquiring spirit and inculcates a less arrogant attitude in the face of the great Unknown. To the investigator it says, "Push the infinite as far as you can. You can always push it farther. Do not fear.

'Veil after veil will lift, but there must be
Veil after veil behind.'

VENOMOUS SNAKES AND ANTI-VENOMOUS SERUMS *

By RAYMOND L. DITMARS

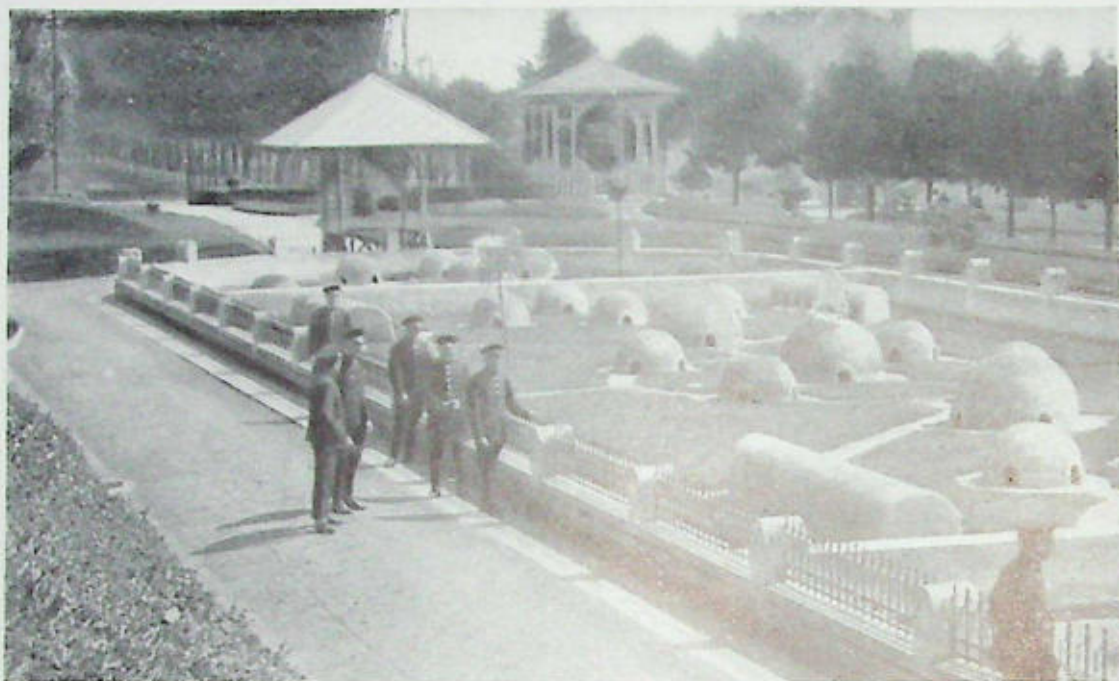
Curator of Reptiles, Zoological Park

AS hiking, camping and long-distance automobile touring are phases of outdoor diversion that have become nation-wide and are gathering tens of thousands of recruits each year, there is a steadily increasing hazard of bites from poisonous snakes. The writer has noted marked increase in reports of snake-bites as well as a mounting series of queries relating to antidotes. It is also of interest to observe that with the conservation of forest

areas and systematic protection from fire in many areas Nature is setting her family in order, and the smaller wild creatures are again taking possession. Despite our objection, the venomous snakes are a part of the natural plan and are increasing along with the others.

As we have established an institution practically interested in all reptilian problems, and as the writer has had rather wide experience with reptiles, the present article is intended to review this subject and explain the hope

*Snake Farm Pictures by Pathé.



A MODERN SNAKE FARM

General view of the enclosure for serpents at Sao Paulo.

of the New York Zoological Society toward securing definite and helpful measures in the preservation of human life.

In British India there is an annual average of over twenty thousand deaths among humans from the bites of poisonous snakes. There is a high mortality in Africa, but owing to the mixture of races and government, even approximate figures are not available. It is recorded that there are several thousand deaths from snake-bite each year in tropical America. In the United States, with a population of approximately 110,000,000, with venomous serpents occurring in nearly all of the States, and in some of them exceeding in abundance the countries where the death rate is high, we have an indicated number of fatalities from bites of venomous reptiles of not much over twenty per year. This is a higher figure than we previously estimated, but a number of widely placed queries have brought interesting answers. We are now systematically gathering figures from all the states. The probabilities are that the figures of this year will about double the estimate for 1922.

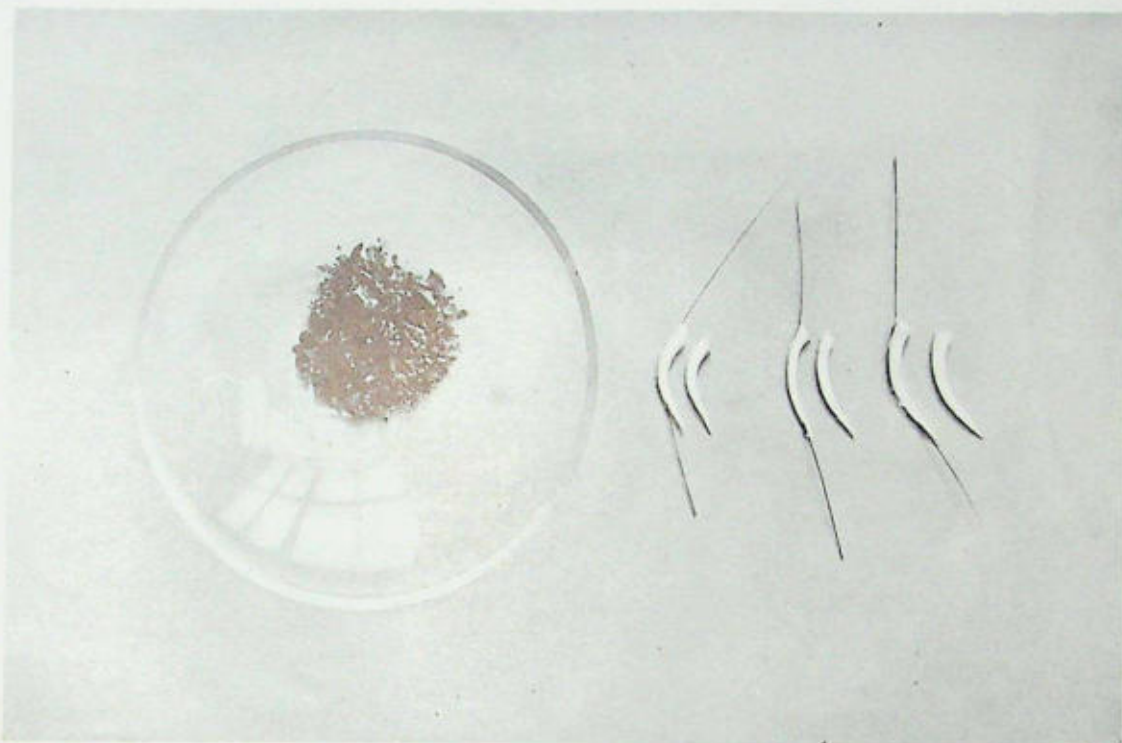
Why is it that accidents in the United States are comparatively few while a number of areas are abundantly inhabited by venomous reptiles? The reason for this is clear to the writer, who

has hunted and noted the habits of venomous reptiles in various parts of the United States—the Atlantic and Pacific Coasts, the mountains, plains, swamps and deserts.

The most generally distributed poisonous serpent in this country and the most abundant in the greater number of infested areas is the rattlesnake, which usually gives emphatic warning when approached. Another abundant type, though over more restricted areas, is the copperhead snake. This is not a particularly aggressive species, and seldom bites unless actually stepped upon or approached to within eight or ten inches, which is about the limit of its strike. The water moccasin, abundant in the South, keeps to its favorite waterways and swamps, and while much respected, it is so seldom given to wandering that the most ignorant negroes know where to watch out for it, and moccasin bites are rarely recorded.

Another poisonous serpent is the gaudy coral snake of the Southeast and the Arizona-Mexican boundary. This is a burrowing type, and accidents are seldom heard of except from venturesome people who try to handle these pretty reptiles.

It is a fairly simple matter to recognize the North American venomous serpents. They are well known among the country populations,



CRYSTALLIZED VIPER VENOM AND FANGS FROM THREE VIPERINE SNAKES

Venom when crystallized is a dark amber color. Beginning at the left, the fangs are, Rattlesnake's, Lance-head snake and Bushmaster. A black hair is drawn through the poison duct of one of each pair.

Photograph by Elwin R. Saurborn.

In the city of Butantan, Sao Paulo, Brazil, is a splendid laboratory known as the Institution of Serum Therapy. One of its main departments was organized for the production of serums for snake-bite. The results of the serums of Sao Paulo have been successful to an astonishing degree. Specific serums are prepared for the characteristic types of dangerous serpents of that country. So remarkably energetic is the action of these products in cases quickly accessible, that the need for a ligature or even scarification in first-aid treatment of wounds has been eliminated.

The method of production is along the most approved technical lines. Horses are immunized by repeated small injections of snake poison. After months of inoculations, which are gradually increased in strength, they are able to withstand an injection of the pure poison that would be absolutely fatal to a non-immunized subject, yet experience no major symptoms. After a short period of injections of the formidable toxins extracted from the fangs of serpents in the laboratory, Nature begins producing in the blood of the treated animal an anti-toxin that neutralizes the

poison's attack. By a carefully-designed and humane method, a moderate amount of blood is extracted from each horse by a process that is not more disturbing to the animal than an application of the clippers used in grooming the average horse for the spring. The extracted blood is so treated that the colorless or serious portion is separated. This undergoes a process of concentration and is then placed in pointed vials. These are sealed in a flame by fusing the glass, and the serum is ready for injection into the human victim by merely pinching off the glass point and inserting the needle of the hypodermic syringe. Kept in a moderate temperature, the serum remains good for approximately ten years.

The serums prepared by the Brazilian Government specifically for use in the United States have been partially produced by the use of snake poisons obtained from serpents shipped to the Institute of Serum Therapy by the New York Zoological Society. We have personally extracted a large portion of the venom. The serpent to be operated upon is placed on a table, the head is pressed down with a rod and the snake grasped by the fingers, im-



A MODERN SNAKE BUNGALOW

A close-up view of a snake shelter at Sao Paulo.

and their characteristic lurking places are clearly established. While there are fifteen species of rattlesnakes in this country, each is equipped with a rattle, and it is simpler to consider them as a type, so we may clarify the matter by considering four "kinds" of dangerous serpents in this country—the rattler, copperhead, moccasin and coral snake.

The greater number in the ranks of the camping, hiking and touring enthusiasts have little or no knowledge about avoiding trouble, whether from poisonous serpents or such a formidable enemy as the malaria mosquito, that attacks. Occasionally camps are unwisely established on mountain sides infested with rattlers, and others are located near tidal marshes. There is a growing request for information helpful in the avoidance of reptiles, as well as in the treatment of bites, and the Society is now preparing the same for general distribution. There also is an urgent need for anti-venomous serums for use in case of accident.

We have taken up this matter with the larger laboratories, and conferences have led to the following conclusions: A serum for snake bite cannot be produced in this country on a commercial basis; that is to say, with any profit for the producer. The cost of production would overbalance the demand. Conferring along other lines, that of largely philanthropic production, and sale of the tubes at the standard prices of other antitoxic serums and thus partially defray the costs of preparation, another objection was encountered: This was to the effect that mortality figures from snake-bite in the United States are so low that

it would not be worth while to engage a staff of serum specialists in the production of an antidote, when such workers could be more practicably engaged in experimentation calculated to produce more efficacious treatment of diseases resulting in high mortality.

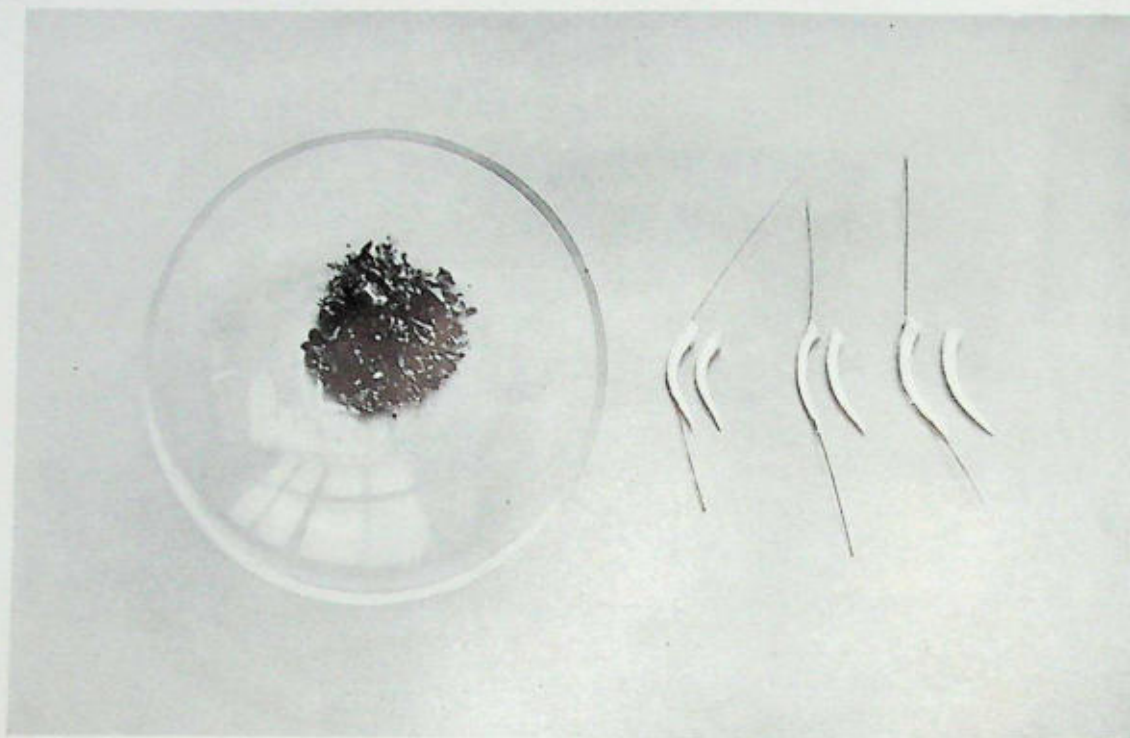
We contend that the training of a small staff to produce specific anti-venomous serums for the treatment of bites of the four distinct types of North American poisonous snakes would not wholly deprive the laboratories of specialists already at work. Although mortality figures now are low, nevertheless they are increasing, and there is considerable danger and much fear of poisonous reptiles. To meet the emergency of bites of poisonous reptiles, we are altogether dependent upon the courtesy of the Brazilian Government for the proper serums.

As the situation now stands, the New York Zoological Society is annually made the repository of about fifty tubes of serum specifically produced for the bites of the dangerous reptiles of this country. This is the sole supply for the entire United States, and we could mail it all in answer to anxious inquirers in a week's time. As it is, we despatch the tubes only to points of great hazard, being particular to verify the status of these, or we rush tubes to points of reported accidents. We have despatched tubes in charge of the conductors on fast trains to various points in the east, and we have delivered tubes locally by automobile. All of this has been done in a purely philanthropic way.



A SPECIMEN UNDER DURESS

Extracting venom at Sao Paulo.



CRYSTALLIZED VIPER VENOM AND FANGS FROM THREE VIPERINE SNAKES

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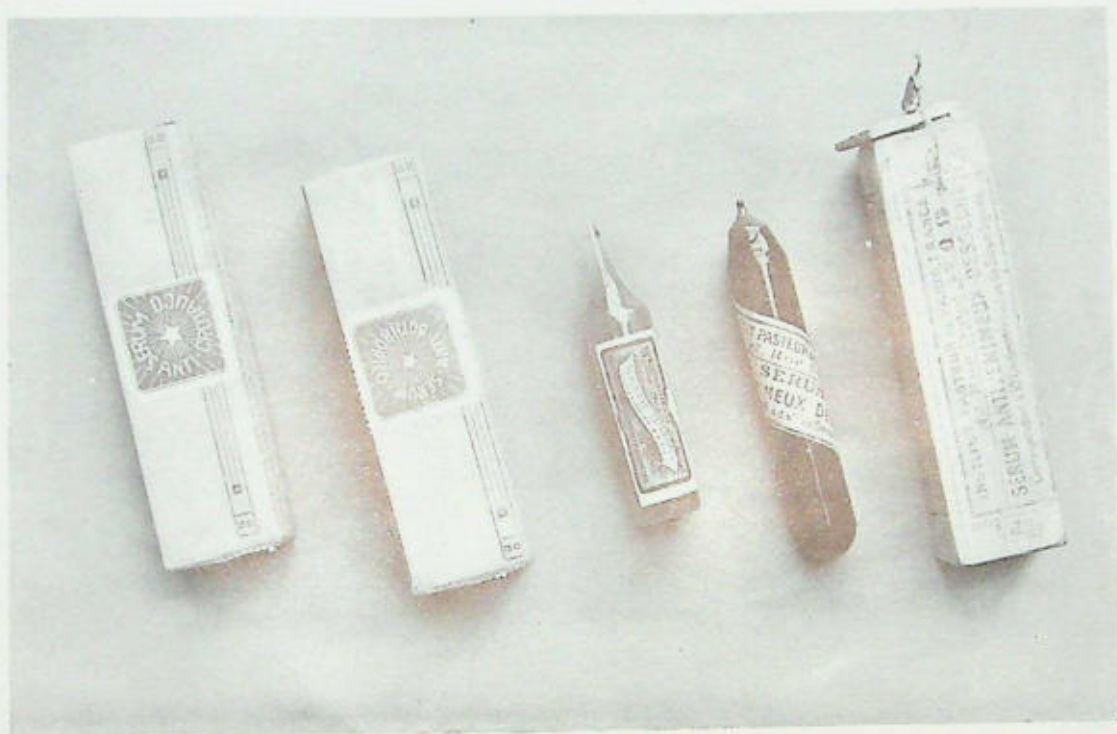
Photograph by Elwin R. Sanborn.

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The method of production is along the most approved technical lines. Horses are immunized by repeated small injections of snake poison. After months of inoculations, which are gradually increased in strength, they are able to withstand an injection of the pure poison that would be absolutely fatal to a non-immunized subject, yet experience no major symptoms. After a short period of injections of the formidable toxins extracted from the fangs of serpents in the laboratory, Nature begins producing in the blood of the treated animal an anti-toxin that neutralizes the

poison's attack. By a carefully-designed and humane method, a moderate amount of blood is extracted from each horse by a process that is not more disturbing to the animal than an application of the clippers used in grooming the average horse for the spring. The extracted blood is so treated that the colorless or serious portion is separated. This undergoes a process of concentration and is then placed in pointed vials. These are sealed in a flame by fusing the glass, and the serum is ready for injection into the human victim by merely pinching off the glass point and inserting the needle of the hypodermic syringe. Kept in a moderate temperature, the serum remains good for approximately ten years.

The serums prepared by the Brazilian Government specifically for use in the United States have been partially produced by the use of snake poisons obtained from serpents shipped to the Institute of Serum Therapy by the New York Zoological Society. We have personally extracted a large portion of the venom. The serpent to be operated upon is placed on a table, the head is pressed down with a rod and the snake grasped by the fingers, im-



ANTI-VENOMOUS SERUMS

Anti-lachesis and anti-crotalus serums of Dr. Brazil, and Dr. Calmette's serum for treatment of bites of cobras and vipers. The glass tube and container on the extreme right is Calmette's.

Photograph by Elwin R. Sanborn.

mediately behind the head. -Of course, this treatment demands great care on the part of the operator. The reptile's jaws are applied to a glass covered with parchment, and when it savagely bites through the fangs discharge a jet of poison. As many as a hundred snakes have been handled during a single afternoon. We have recently extracted and kept separate the venoms of the southern moccasin and the copperhead snake with the hope that the Brazilian laboratory could find time to produce separate anti-venomous serums for those species. Such special products would, of course, result in more efficacious antidotes than the rattlesnake antitoxin we are now using for all venomous bites. But there is yet much local work to be done in Brazil, and opportunity has not been found to prepare these specific grades. This work, however, should be done in the United States without imposing upon the time of our distant colleagues.

Our first contact with the Institute of Serum Therapy was through Dr. Vital Brazil, then in charge of serum production. Dr. Brazil very opportunely arrived in New York for a visit on the day that our Headkeeper Toomey

was bitten by a large rattlesnake. When Mr. Toomey had reached a very critical condition we heard of Dr. Brazil's arrival. Fortunately he had brought with him some tubes of his rattlesnake serum. A limited injection of his product produced astonishing results. A decrease of the great swelling, fever, discoloration and partial collapse, and Mr. Toomey's life was saved.

Dr. Brazil has since retired from the Sao Paulo institution.

For all recent courtesies from the South American institution we are indebted to Dr. Afranio Amaral, who has visited us, conferred upon many important details, presented us with numerous tubes of serum, and explained the results of his treatment of snake-bites.

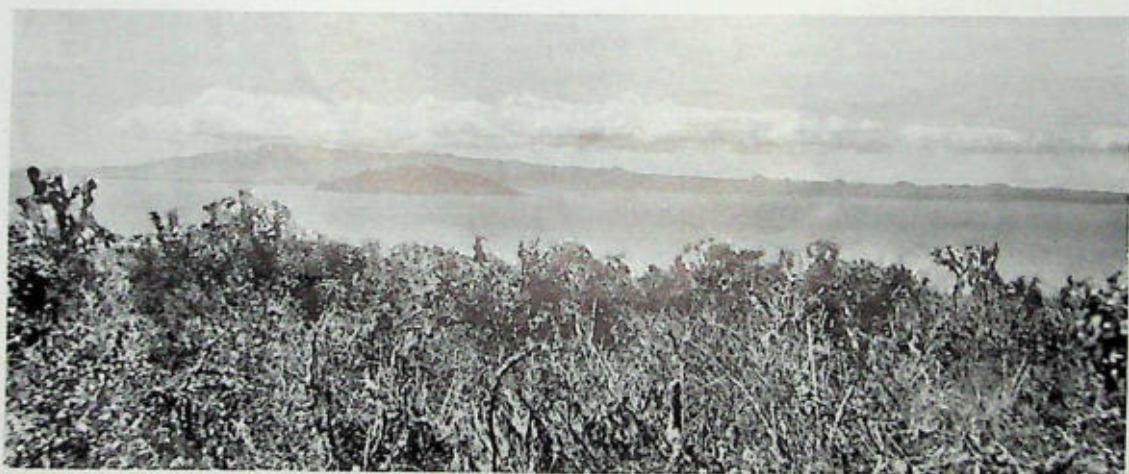
The poisonous serpents at Butantan, consisting of bushmasters, lance-heads, palm vipers and rattlesnakes, are cared for in a very interesting way. The institution maintains a "snake park" of novel layout, of dome-like design, like outdoor ovens. The reptiles prowl over lawns of well-kept grass and radiating paths. The snake park is surrounded by a moat filled with water, and a cement wall prevents

their escape. The enclosure attracts much interest, and naturally enables visitors to become acquainted with the deadly types of South American reptiles, which exist in Brazil in greater variety than in the United States, although it is doubtful if they are more numerous than in some areas of this country.

The Reptile House in the Zoological Park contains abundant living material to furnish an equivalent for the collection in Butantan's snake park. The writer is prepared immediately to extract venom from our specimens if laboratory facilities can be found for the production of serums. We are thoroughly familiar with the processes of poison extraction and the sources of specimen supply. Inasmuch as it is quite impossible for the Zoological Society to undertake the production of serum, it is

earnestly hoped that some United States institution or bureau will volunteer to undertake that work. The actual necessities of the American outdoor population now demand it.

In the meantime, it will be well for campers and hikers who are venturing off the beaten trails to become acquainted with the best kinds of wearing apparel to adopt for use in snake-infested areas. Girls in "knickers" with thin stockings and men in low-cut shoes are in generous numbers among campers. High shoes and stout leather or canvas leggings would eliminate much risk, as we have noted from frequent accidents. Climbing over rock ledges with a reckless use of the hands has produced numerous accidents. Another error to be noted, and easily avoided in this broad country, is the location of camps near rock ledges, places where poisonous snakes love to congregate.



TANGLED VEGETATION ON THE SLOPES OF DUNCAN

Through this maze of thorns and cacti, the tortoise was carried from the crater. James and Jervis Islands in the distance.

CAPTURING A GIANT TORTOISE*

By JOHN TEE-VAN

Assistant, Tropical Research Station

Photographs by the Author

THE great tortoises that inhabit the Galapagos Islands are close to the dark edge that marks extinction. On some of the islands belonging to the archipelago they have already vanished, and the remaining islands are supporting but a mere remnant of the vast numbers that once swarmed over the rough lava slopes of their hillsides and valleys.

Theirs is a failing race, doomed to disappear, unless a miracle takes place, within a few generations of mankind. And when they go they will take with them the secrets of how and where they originated, for to-day but little more is known of the beginnings of these tortoises than when they were first discovered.

The disappearance of these round-backed, hard-shelled creatures is but another chapter in the tale of the destruction of a race of animals

*Department of Tropical Research, Contribution No. 147.

by man. In the old whaling days, when voyages lasted from two to five years, the tortoises' ability to remain alive for months at a time without food or water constituted an excellent reason for capturing them in vast numbers. Whaling vessels would stop at the islands, fill their empty holds with living tortoises, to be killed and eaten when needed. Captain Benjamin Morrell, who visited the islands on a fur-sealing cruise in 1825, writing of these tortoises, says:

"... They are excellent food, and have no doubt saved the lives of thousands of seamen employed in whale-fishing in these seas, both American and English. I have known whale ships to take from six to nine hundred of the smallest of these tortoises on board when leaving the islands for their cruising grounds, thus providing themselves with provisions for six or eight months and securing the men against scurvy. I have had these animals on board my own vessels from five to six months without their once taking food or water, and, on killing them, I have found more than a quart of sweet, fresh water in the receptacle which nature has furnished them for that purpose, while their flesh was in as good a condition as when I first took them on board. They have been known to live on board some of our whale ships for fourteen months under similar circumstances without any apparent diminution of health or weight."

Other old accounts repeat the same story, and it is a wonder that tortoises of any kind or size remain after this systematic destruction, which was continued for year after year, without thought or care on the part of the destroyers.

At the present time the few that are to be found are no longer on the coastal portions of the islands where years ago they were so plentiful, but are hidden deep within the craters or among the higher gullies and valleys. The smallness of their numbers makes it no longer a necessity to migrate for food or water, and the trails made by the tortoises and described by the older explorers were nowhere to be seen on the islands visited during the past year.

During the last twenty-five years the few expeditions that have been at the islands have all given the same monochrome report—a general scarcity of these ancient reptiles. Mr. Frank Webster, who collected for Lord Rothschild, declares that: "I consider now that these creatures are so nearly extinct that any remaining ones will only be stragglers and

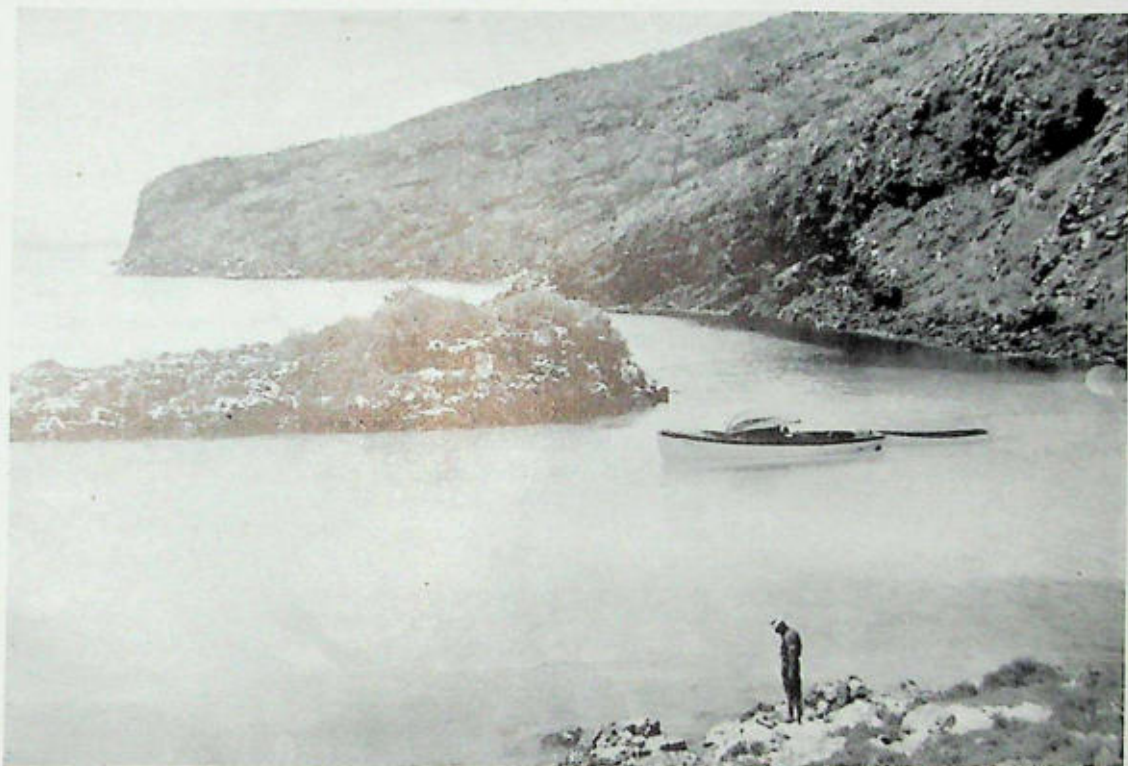
will only be secured at a great expense of time, hardship and money." Later, however, Mr. John Van Denburgh, in a very excellent report published by the California Academy of Sciences and based upon seventeen months' exploration in the archipelago during 1905 and 1906, mentions one locality, Vilamil, on Albermarle Island, as having tortoises in abundance, and another, Duncan Island, as having them fairly abundant. The tortoises on the other islands of the archipelago were classed as "rare," "very rare" or "extinct".

Such was our knowledge of the presence and numbers of the animals from which the islands take their name. Naturally such rarity only increased our desire to obtain a tortoise for exhibition in New York. On our first trip from Panama on the Williams' Galapagos Expedition, we searched in many places—along the shores of Indefatigable Island, in the wooded country above the long, sandy beach of James Bay, and beyond the precipitous sides of Tagus Cove on Albermarle Island. But no tortoises were to be seen, no indication of their presence could be found, either recent or ancient; not even a stray bit of worthwhile information from the inhabitants of Chatham Island. On the second expedition the same negative results were yielded by the opposite side of Indefatigable, and on the flat veldt-like country of South Seymour Island.

One day toward the end of our stay the temptation to explore the double rounded slopes of Duncan Island overcame us, and we decided to test the truth of the statement that on that island tortoises were "*fairly abundant*." So early one morning five of us started from the "Noma" intent upon securing a tortoise from that island.

Our expedition had at least one great stimulus. The "pot of gold at the end of the rainbow" was the largest of its kind. These tortoises and their close relatives living in the surrounding Galapagoan Islands and a group of cousins in the far distant Marquesas were not to be included in the categories of ordinary big game, but in the list of giants. Occasional specimens have been found weighing over four hundred pounds, and Lord Rothschild mentions one that he considered weighed over eight hundred pounds!

From Seymour Bay to Duncan Island is twenty-five miles. The first sixteen lay along the low shore of Indefatigable, and over a calm Pacific sea, gently rising and falling in long, low rollers with an almost imperceptible motion. Only as one watched the horizon and



LANDING PLACE, DUNCAN ISLAND.

From this point the expedition started on its way to the interior.

saw that the line of the earth was neither straight nor yet quiet, did one realize the great forces at work on the face of this calm sea.

We passed a school of great sea turtles quietly sleeping on the surface, entirely oblivious of the presence of the ultra-modern boat and only awakening and sounding when we approached within fifty feet.

The last eight miles, between Indefatigable and Duncan, is upon open ocean, whose wide expanse reaches to the cold wastes of the Antarctic.

When we took our departure from Indefatigable the steersman was instructed to hold a course so that we would land near the bottom of what appeared to be a long, deep gully between the two larger mountain masses of the island. From our boat we could see no indication of the shore. Our only guide to places that might develop into landings were wide, pale lines running from top to bottom of the island, which we thought were gullies, but which, upon closer investigation, proved to be the ridges of hills. As we approached the island the tall cliffs to the southward stood out more clearly, but gave no

promise of a suitable landing place. Relinquishing the idea of landing anywhere near the cliffs, we decided to keep on toward our original objective—the central gully. When we were two hundred feet from shore a small island revealed itself, standing out from the rocky mainland, framed on either side by the pale pastel green of tropical shoal-water. Behind the island we cast anchor, with ten feet of water beneath the keel, with full protection from possible storms and a good stone beach on which to land.

On shore we established a cache, leaving all extra supplies that were not absolutely vital to the trip. At 10.30 in the morning we started off, each of us carrying provisions for two days and a single blanket. Divided among us were camera and tripod and extra photographic plates, ropes, two boat-hooks with which to make a sling for carrying a tortoise, bush knives to clear a trail and extra canteens of water.

When we moved off it was under a blazing, hot sun. Not a breath of fresh, cool air came to us, but as we looked backward and out over the water we could see here and there small

areas rippled and annoyed by breezes,—tantalizing visual proof that somewhere at least there were cool and refreshing breezes.

Beneath our feet were the lava rocks that formed the entire surface of the outer slopes of the island, usually with a maximum size of one or two feet, and with exceedingly rough and often sharp surfaces. When stepped upon these rocks gave forth a clear ringing note, much like that produced by striking together two, old, well-preserved, Dutch bricks. Rising from the interstices between the lava blocks were small bushes growing from four to ten feet high, gray-barked and sparsely leaved. Here and there a patch of grass attempted to rear its head, and occasionally a small cactus pushed forth its spiny body, extracting its sustenance from an infinitesimal amount of decomposed lava.

Great yellow spiders and an occasional silvery-gray one, had spread their filmy webs in intricate patterns from every branch and leaf and twiglet, forming open-air labyrinths through which insects had to pick their way or else pay the penalty for failure. The first man on the trail tried to destroy as many of these webs as possible, and whenever that unfortunate person neglected to do so, one became aware of a sticky, webby, viscid mass cemented to one's face.

Half-way up the side of the mountain the character of the vegetation changed slightly. Grasses were more abundant, and the walking consequently more difficult. The cacti had enlarged, and by reason of their tree-like stems might be dignified by being called trees. Some of these strange plants were over a foot in diameter at the ground, going upward, pillar-like, to ten or twelve feet. Their thick, heavy, spiny leaves grew at absurd angles, growing out of one another like the symbols of an inverted genetics chart. Occasionally they would display to unappreciative finches and mockingbirds their small, yellow blossoms.

Slowly and yet more slowly we climbed upward and onward, ascending on an average three hundred feet an hour, stopping to sip a small mouthful of water at each hundred feet. One would look ahead, see with relief the crest of the hill above, and reach it, only to find that it was not the top and that far beyond stretched another top. Finally, oppressed by perspiration and a firm belief that there was no top to the island, we accepted our fate and kept plodding on and up, totally disregarding everything else but the thought that giant tortoises might be at the end.

At last a shout from the leader made the rest realize that the crater—our objective—was in sight, and in a few moments we had all assembled on the rim of the great northern crater of Duncan. Our preconceived ideas had been of a much smaller bowl. The flat bottom stretched over three-quarters of a mile from side to side, circular in outline and perfect in contour except two tongues of hills that entered the southwestern side of the great arena. Armies might have fought in this bowl, its size was so great. But here practically no animal life existed, birds did not nest upon its soil, and only a few lizards played about on the bottom. However, we hoped that somewhere among the luscious green grass of the western side a few tortoises might still exist.

We rested for a few moments at the edge and photographed the surrounding country. A figure in the crater would have been a desirable stage-property to have in the photograph, so two men volunteered to descend the wall to the bottom of the hill and become human foot rules. The two descenders left with a remark that "We ought to be at the bottom in ten or fifteen minutes." Three-quarters of an hour later they emerged upon the bottom lands; and as they were so far away and so small, they were useless as figures for comparison. They were quite invisible on the ground glass of the camera, and the only way that we at the top could keep track of their movements was by watching the tiny white specks that denoted their white helmets.

Although the visual gap between the two parties was so great, the vocal connection was clear and perfect. The acoustics of the crater were so good that no difficulty was experienced in communicating from top to bottom, either when the lower party was just below us or when it was at the opposite side of the bowl, three-quarters of a mile away. Thus it was that from the opposite side of the crater we heard an exultant scream of, "I've got one!" and a second later a confirmatory yell to us at the top. The tortoise, a medium-sized animal, had been found among the tall, dark-greenish grasses that formed the bed of the valley of one of the tongues of land that projected into the crater.

Those of us who formed the upper party now decided to move along the rim to its lowest place on the eastern side of the island so that the climb out of the crater might be as easy as possible. After half a mile of struggling through thorns and spider-webs we



GIANT TORTOISE

Captured by the Williams Galapagos Expedition.

reached the lowest point. Meanwhile the captors had roped the tortoise to the two poles and were carrying her slung between them, much as men carried palanquins in older days. Two of us climbed down the wall to assist in raising the animal from the bottom to the top. After much exertion and slipping and balancing and most difficult climbing the tortoise and four men, all more or less tired, arrived at the top, just in time to see the sun go down over the valleys of Albemarle Island, some fifteen miles away.

From the crater rim to the anchorage the distance was about a mile and a half; that is, it would be a mile and a half by actual measurement. But to those who carried the tortoise, inches had become feet, a yard was an interminable distance, while a mile had become an unacquaintable period of space and time, comparable only to astronomers' terms when they speak of light years and the orbits of comets. All our ideas of distance and size had received a Brobdingnagian impetus. Thorns that were an inch long when we passed them by in daylight now assumed scimitar-like proportions. And in the mellow moonlight the

stones that we walked upon became like the great pillars of the Giants' Causeway, built and fashioned for men much larger than we.

For half the distance the tortoise was carried lashed between the two poles, clanking against the wood and occasionally hissing. And all the time the poles bored ridges into the shoulders and hips and raised blisters upon the hands of the carriers. Each step taken would mean a jar upon some portion of human anatomy, as the impossibility of two individuals walking synchronously over such a roadbed was momentarily demonstrated.

Just as darkness came down completely the lashings supporting the tortoise slipped and the entire cavalcade stopped to repair the damage. Fifteen minutes of trying to relash the beast in darkness were thrown away when the tortoise stretched its legs, and, like Houdini, cast off its shackles. A few more attempts at tying the animal securely failed to produce a binding firm enough to hold. Then, in a fit of desperation, one of us volunteered to carry the tortoise to the boat. So the tortoise was turned upside down, and, taking a grip on the hinder part of the carapace, the carrier started away.

But the distance to the landing was too great to be covered by one man carrying such a weight, and the problem was solved by relaying from the shoulders of one man to another. By this method we were able to progress about three times as fast as when the animal was carried between the two poles.

In the dark we followed no trail, nor was there one to follow. We plunged downward and onward, over rocks, through thorns and briars, swearing sometimes softly, and at other times loudly and more to the purpose. Each step had to be carefully gauged, as the rocks were sharp, very insecurely laid, and weight placed upon an insecure stone meant a dislodging of the rock and a consequent violent displacement of the center of gravity of the displacer.

Every hundred yards we exchanged the shoulder load, and every hundred yards we remarked upon the unpleasant elephant-like odor of our cargo. Every hundred yards and also in between we were reminded by the gurgling of the water within the tortoise of the emptiness of our canteens. This liquid

noise brought forth visions of cold, tall glasses, with clinking ice and amber fluids.

Eventually the end of the trail was reached. We refreshed ourselves by a swim in the cold dark waters of the Pacific and bathed ourselves internally with smoky-tasting water from the lifeboat barrel. Then the boat was made ready.

On the way back to the *Noma*, under the brilliant equatorial star-lit sky, the tortoise was assigned to the small rowboat that was towed behind the launch. The odor had become too much for us, and this unpleasantness was wafted away from us on our journey.

Sad to relate, the tortoise did not live long enough to reach the Zoological Park. A week after her capture she died, demonstrating by her death that the racial stamina of her species is more or less exhausted. But a useful purpose is still in sight for this latest tortoise from the Galapagos Islands, and within a habitat group at the American Museum of Natural History her shell, representing the species *Testudo ephippium*, will be seen upholding the honor of a glorious race of animals, a race now about to disappear.



"MISTER, TAKE OUR PITCHER."

It was a silent but eloquent audience and its appeal was mutely and sweetly made. Absorbed in the antics of a savage mule deer and the perspiring efforts of the photographer, these little Bronx fledglings were unconsciously gratified. The excitement over, the rather blasé young shepherd gathered his flock and disappeared.

Photograph by Elwin R. Sanborn.



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WILD ELEPHANTS WALLOWING

Quite unexpectedly the author found himself face to face with an elephant just fresh from his mud bath in the hole beyond (right background) and now approaching his mate still enjoying a wallow. Elephants rest standing, or leaning against tree trunks, and it has often been disputed whether African elephants ever lie down or wallow. This unique photograph, taken from a high ant-hill which also served as a screen, settles authoritatively an interesting point in their life history.

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WILD LIFE ON AND AROUND MOUNT ELGON, EQUATORIAL EAST AFRICA

By LEON BAYER, M.D.¹

Formerly of the Tropical Institute of Hygiene, Amsterdam.

Illustrations from Photographs by the Author

PART I. THE JOURNEY TO MOUNT ELGON

AFTER hundreds of years of exploration in all parts of the globe to discover the last stretches of unknown lands and new forms of life, Africa has still no equal as the game garden of the world. South of the Sahara, the greatest of deserts, from west to east and from north to south, innumerable herds can graze and browse unhampered by mountain chains. The West African Rain Forest, it is true, excludes the grazing antelopes, but on the other hand adds its own quota to the variety of this unsurpassed continental fauna.

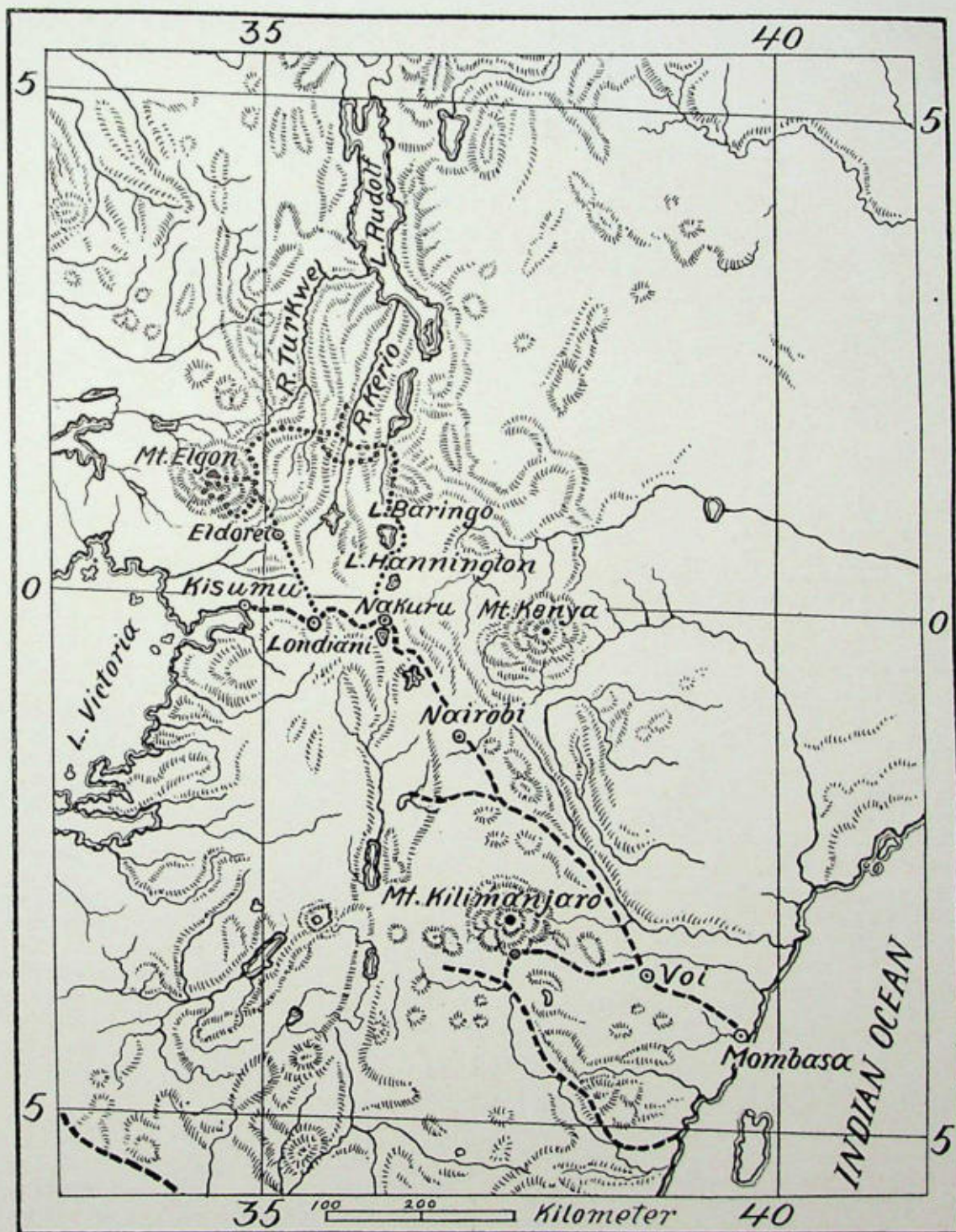
South Africa's original wealth of game, of course, has received the same staggering blow that civilization and husbandry naturally inflict upon the untrammelled forces of Nature everywhere. Great efforts are needed to prevent the extinction there of some of the wild animals that formerly roamed in countless thousands, or they will share the fate of the quagga (*Hippotigris quagga*), the blaubok (*Egocerus leucophaeus*), and the southern race of white rhinoceros (*Ceratotherium simum simum*). A close relative of the quagga, the mountain zebra (*Hippotigris zebra*), the handsome bontebuck (*Alcephalus pygargus*), and the blesbok (*Alcephalus albifrons*) are now on the verge of extinction and are only known from a few localities, partly under semi-domestic conditions. Forces for preservation, under the stimulus of the great cham-

pions of wild life, Messrs. William T. Hornaday and A. K. Haagner, have engaged in a valiant effort to convince the South African government of the need to protect this heritage, which is a part of the great wealth of the country.

Strange as it may seem the teeming wild life of British East Africa has really been preserved by the bravery of phalanxes of Masai warriors, in spite of the continued onslaughts of greedy Arab traders. Long after the arrival of the white man the Masai, by their annihilating attacks, so effectively guarded their domain, that as a result the great caravan route on which slaves and ivory poured eastward was of necessity laid to the south through less inviting regions from the trader's point of view. Living essentially off the meat, milk and blood of their numerous herds of cattle, the Masai killed no game for food. Their fearless warriors, however, brought sure destruction upon raiding lions which found it easier to prey upon the natives' stock than upon the fleet wild animals. They met this prowling foe in the open, relying solely upon their unfailing aim and the sharpness of their long, slender spears. A hood made of the lion's mane was the crowning glory of the brave whose weapon laid low the roaring enemy. It was a mark of distinction in battle.

To many Americans parts of East Africa are better known than their own West was to most of their grandfathers when buffalos roamed there by the thousands. The Uganda railway

¹ Arranged for publication by Herbert Lang, Assistant Curator of African Mammals, American Museum of Natural History, New York.



MAP OF EASTERN EQUATORIAL AFRICA

The Uganda Railway, from Mombasa to Kisumu, and the other lines now connecting with it, are shown by an interrupted line. Striking out from Londiani, the highest point on the Uganda Railway, the itinerary of Mr. Auguste Mahieu of Armentières and of Dr. Leon Bayer, the author, also of Belgium, follows the dotted line north to Mt. Elgon, east across the Suk plains, south to Lakes Baringo and Hannington, and connects with the railway once more at Nakuru.



THE BUTTRESSES OF MT. ELGON

The abysmal buttresses crowning Mt. Elgon are all that remain of its huge crater. Shelves and slopes shelter groves of aborescent *Senecio*, and low bunches of everlastings help beautify the scene. Far from being devoid of mammal life, there lives here, among these tussocks, a multitude of smaller rodents.



Two Turkana warriors whose home was farther north than our route, near the southern end of Lake Rudolf. They ornament their hair with ostrich feathers. In a hole pierced through the underlip many braves insert a piece of porcupine quill, and most warriors wear a band of dried hide about the upper arm.

has eliminated all the drudgery and shortened a former two months' caravan journey from the coast at Mombasa to Lake Victoria to less than two days. The time thus gained makes quite easy problems which before seemed well nigh impossible. Throngs of settlers have poured in near this main artery and few fastnesses remain undisturbed. Agriculture and general husbandry struggle on, but no great mineral wealth has given to it the impulse of an industrial strife. Such conditions were not conducive to increasing those particular treasures of nature which flourish best when left alone. In the last few years this paradise of big game has come under the spell of the every day traveler.

Not everywhere, however, is travel the shallow amusement where high-power rifles, motor cars, and other comforts play the most important rôle.

To explore the more distant country bordering the southern end of Lake Rudolf were our original plans. Mr. Auguste Mahieu, whom I had the pleasure to accompany, had really set his heart upon seeing those regions. But the

plundering Somalis and Turkana had given considerable trouble there lately, causing us to change our route and abandon that part of the project. The government, face to face with the problem of rapidly bringing to justice these semi-nomadic cattle raiders, plays absolutely safe in refusing to permit outsiders to enter such territories. Fortunately our equipment allowed us to tackle the cooler altitudes of Mt. Elgon as well as enter the desert wastes of the Suk country to the northeast, in the upper reaches of the Turkwel and Kerio Rivers.

Far off the beaten track to the north of Lake Victoria Nyanza rises to glorious heights the blue masses of Mt. Elgon, which will long remain a refuge and sanctuary of its own. Neither railroad nor motor scale its lofty foothills nor is there other comfort than the soft breezes wafted from the summit. The refreshing view ever grows in beauty as one continually reaches higher levels. Game seems to roam there for sheer enjoyment, though unable to satisfy fully the gregarious instincts that the plains foster. The impressive quiet of the unknown prevails unbroken right up to the exquisite line of luxuriant alpine flora topping an equatorial mount-



Of unusual interest is Mt. Elgon's placid crater lake, with its rugged background. At over 14,000 feet the vigorous alpine vegetation typical of mountains under the tropics secures a hold in every nook and cranny, and provides welcome homes for many of the smaller mammals and other creatures.

ain. Small herds of elephants cause a strange fascination as their gleaming tusks emerge from the darker masses of green. Gradually through the foliage little patches of hide reveal the huge bulk which sways out into the open and plunges again into obscurity. At dusk clouds of mist vagrantly cover all secrets with a fluffy mantle of silver. With dawn, the rising sun gilds and sets afire the billowing, ever shifting floods of the ethereal maze. While colors and shapes engage in showy rivalry, we wonder what of this mystery the sun will reveal to us this day, as we stand gazing north towards the parched stretches of the Turkwel plains.

Instead of starting from Kisumu, the oppressively hot railway terminus on Lake Victoria, we gave preference to another route, using Londiani, the highest spot on the Uganda railway, as the point of departure and proceeding northwest to Eldoret. This course has many advantages as the high plateau proved ideal for a naturalist. Grassy plains give way to beautiful park lands, and patches of dense forest cover the slopes of the hills, which are separated by luxuriant valleys.

On the plains the mixed herds of antelopes

and zebras move leisurely to and fro, most of them grazing, some watching as sentinels, some playfully contesting, others engaged in stubborn fight, but with one accord swinging into rapid pace away from what has become a point of danger. Suddenly the thundering herds of galloping zebras stop and form a long line facing the intruder. Furthermore, all cause for alarm seems forgotten as the ever-fighting stallions rear again and savagely use their teeth in an effort to grip their adversary's mane.

Most of the antelopes, however, do not ascend to these altitudes, although small herds of the ubiquitous and stately waterbuck have sought out the watered fields. In the thickets the loudly barking, brownish males of the bushbuck (*Tragelaphus scriptus delamerei*) play a lively game of hide-and-peek. Suddenly with high leaps the much brighter colored female bounds away, hardly touching the blades in her onward flight. Even disregarding the color differences of the two sexes and the fact that young males carry the same reddish coat as the female, there is no mistaking her, for as in the case of the reedbuck (*Redunca redunca wardi*) she is minus horns. Another point in common



The tall Masai-Suk natives of the Kerio country are distinctive in many ways. The beaver-tail-shaped appendage of hair they wear down the back is firmly attached to their own hair, most of it being inherited from their father and other relatives. It is a cherished possession, the size indicating the importance of the man. The hair is carefully plaited with cow dung, clay and fat into a bag. In this receptacle are also hidden a few treasured articles which are then secure from theft as the only opening into the bag is on the lower side at the neck. The Masai-Suk are still a very war-like race, but otherwise often travel with their women.



Grant's gazelle is one of the prettiest of the large group of gazelles. It occurs in herds of several dozen and prefers the more open stretches. The beautiful, lyrate, heavily ridged horns of the male, his proud carriage and stately demeanor among the herd, contribute to his remarkable appearance.

between bushbuck and reedbuck is that both can be approached often at short distances. Nothing more graceful can be imagined than the picture of their sleek, lithe forms speeding over the high grass of the hills, where after the first few bounds they dexterously find means to disappear as by enchantment.

On the park lands and invading the forest roam small herds of buffalo (*Syncerus caffer radcliffei*), but though we followed their spoor eagerly for many a weary mile, we never managed to catch sight of them. It gave us, however, an opportunity to see the luxuriant vegetation, truly tropical in its profusion, the tree-trunks often heavily covered with showy air-plants, or epiphytes. Unusually great numbers of the lovely large flowers of the white orchid (*Angraecum*) enlivened the scene.

One night an Askari spied a dark form moving about and, shooting, secured a wild bush pig (*Potamochoerus*) which for some reason or other had invaded our camp. An inhabitant of the bush country of the lower level, it is rarely seen during the day except in a great hurry seeking shelter when accidentally routed from cover. This is not open country suiting the lion, but rather owned by the leopard and a variety of small carnivores such as genets, civets, and mongooses. The streams, so our native guide claimed, harbor otters. There is the usual variety of the more common smaller

rodents. Hares abound along the margins of the woods in the grass and gambol about towards dusk, or also after rains, behaving much like their cousins in other lands. They proved to be equally delicate in flavor. At night the peculiar barking of the *Dendrohyrax* lulled us to sleep. These little tree hyraxes are strictly arboreal and highly prized by the natives, for the heavily furred skins, rudely tanned but well sewed together in narrow oblongs, serve as long cloaks for the notables of the tribes. Though simple, these garments fall in imposing lines from the broad bronzy shoulders, adding much to the stately mien of the chieftains.

Before leaving our first camp we discovered two new bird forms, described by Lönnerberg² as a new white eye (*Zosterops bayeri*), which differs in many respects from its Elgon relative, and a dark hawk (*Astur tachiro tenebrosus*).

On reaching part of the Nandi escarpment at over 9,000 feet true mountain forest appears. Stately groves of juniper (*Juniperus procera*), which here attains 100 to 130 feet in height and a diameter of over three feet, represent part of the most valuable African timber. Clusters of bearded lichen form delicate draperies and underfoot grow many flowers familiar to more northern climes. The temperature is delightfully cool, averaging about 50° F. during the day.

² Arkiv f. Zool., XI, 1, No. 5, 1917, pp. 2-3.



The impala attains particularly large horns in the drier region north of Lake Baringo. It is always met with in the neighborhood of water. When suddenly alarmed the impala offers an exhibition of high jumping, fleetness, and grace hardly to be equalled.



Brush covered upland, with thickets to hide in during the greatest heat of the day, is an ideal home for this bushbuck. Late in the afternoon, sometimes as many as four or five of these sprightly animals may be seen browsing in an hour's stalk; old males, however, are generally alone.

Beyond this escarpment one descends into immense plains which are rapidly becoming settled by farmers, mostly of the sturdy South African Boer stock. A few miles north of Eldoret the Nzoia River is a welcome interruption. Here and beyond to the foot of Mt. Elgon lies a region where a great variety of game may be met, for the country changes considerably. Jackson's hartebeest (*Bubalis lelwel jacksoni*) are often seen on sentinel duty atop the termite hills. At their alarm they take with them in headlong flight all the other game in view. In the uneven grassland



Sufficiently open grass country is generally the grazing ground of these zebras. By their noisiness zebras attract attention and give pleasure more than any of the other gregarious game. Their alertness, curiosity, extraordinary manner of moving in close order, their mad stampedes, and sudden calmness, their fighting among themselves, and good fellowship with other game, all these traits represent the spirit of the plains. Their colorful neighing, especially at night when the clattering of hoofs has ceased for a moment, is a signal for creatures for miles around,

the small, fleet oribi (*Ourebia montana cottoni*) and the deer-like reedbuck may be startled from their resting places.

On the plain, too, we met a large herd of elephants (*Lorodonta africana peeli*) feeding peacefully here and there in small groups. Due to the nature of the surroundings it is generally difficult to count these pachyderms. After many efforts in vain, we decided that the higher lying hills offered us a fairer chance of seeing them. From this vantage point we were able to discern that this one herd numbered about 200. But there were



THE MOTHER GUARDIAN OF MT. ELGON

On the north-eastern fissure, through which the author gained access into the crater, the eruptive rocks have been carved into strange shapes. Probably at first they were buried in volcanic tuff, but erosion has left only the harder parts standing. According to native tradition this crude column is a watchful spirit sitting against a rock which the people ought to avoid looking at.

no large tuskers among them. While reconnoitering I happened to come up so close to two of the elephants as to get a unique photograph. The one in the foreground was wallowing to his heart's content, lying flat in the mud. His mate, beyond, had just left another wallowing hole. But our surprise had hardly begun, for in the same swamp we espied a leopard (*Panthera pardus chui*). With so many elephants around he seemed entirely out of reach, but as luck would have it he fairly walked

into the range of our rifles, presenting us with an unusually fine pelt. Repeatedly that day we came upon the remains of Jackson's hartebeest, clearly killed by lions which here seem to prefer it to any other game, although zebras are common. It was evident too that hyenas, jackals, marabous and vultures had all shared in the lions' repast.

Arriving at the base of Mt. Elgon we established what we called Junction Camp. From here we undertook the ascent of Mt. Elgon.

Just north of this place was our base of supplies, "Campi Doctari" or "Campi Ziwani," to which, before leaving Londiani, we had sent ahead enough provisions to see us through our trip to the north of Elgon. Past here runs the well-worn trail used by the Somali and other natives to reach the railroad and port near Lake Victoria.

We could hardly decide to tear ourselves away from Junction Camp. With cool rivers flowing down the slopes, swamps everywhere, far-reaching plains, shady park lands and virgin forest, no wonder there is game in profusion. Lions (*Leo leo massaica*), though never roaring, were rather numerous. A wooded island amidst the swamps was their favorite resort. Their claw marks in the bark of trees about seven feet above the ground showed that some of them at least came there regularly to "make their nails" like all other cats. Curiously enough we succeeded in bagging only one lioness and that in a way which was most unpleasant. One of our men, acting as a "driver," in aimlessly beating through the grass with a stick he carried, must have accidentally hit the lioness. He was not aware of her crouching at arm's length. Infuriated, she charged, and in the ensuing tussle before an effective shot could be placed she mauled him badly, without however injuring any vital parts. When three weeks after, "Siafu" was well again, he firmly believed I had saved his life. Lions apparently are often conscious of the advantage of attacking at close quarters and cunningly let the victim approach their lair. On the other hand, defenseless antelopes on the short grass plains make every effort speedily to put distance between them and their enemies.

Nowhere in the marshes and open stretches of water did we encounter hippopotamus or situtunga but near a pond birds were exceedingly common. Among the flocks of pigeons that sported about near the shore was a rare turtle-dove (*Turturoena delagoruei sharpei*).

With the end of April, we decided to ascend Mt. Elgon by the southeastern slope. On entering the foothills the well-beaten trails of elephants sometimes offer a smooth and comfortable path where these huge pachyderms cut their own highways into the wilderness to near the top of the mountain. Small troops of giraffes (*Giraffa camelopardalis rothschildi*) in awkwardly bounding gallop proved to us their far-seeing powers; one afternoon, however, three of the bolder members only took to flight a short distance in front of the caravan. Well

screened from view by a perfect maze of branches and foliage, they were approached unknown to us. Very different acted the black rhinoceros (*Diceros bicornis*), of which a number were met during the first few days of our ascent. Frequently we had to halt the caravan to allow them to move away as much not to invite attack as to allay the fears of our porters. Late in the afternoon when hunting for francolin (*Francolinus schütli maranensis*) I just escaped by a hair's breadth what might have been an untoward incident. So intent was I on the search, I took my stand in front of what on hasty glance seemed to be an aardvark burrow. Imagine my surprise when a belligerent warthog (*Phacochoerus*) shot out. Later events proved he was as greatly scared as I. This den had been considerably widened to accommodate its new fossorial inmate. Warthogs, by the way, are frequently seen during the daytime in troops or singly. The Ndorobo guide then and there promised surely to show me one of the huge black forest boars (*Hylochoerus*), whose great plowing action I later had ample opportunity to marvel at in the higher lying mountain forest.

(To be concluded in the January *Bulletin*.)

\$850,000 MORE ENDOWMENT OR— WHAT?

There is a tide in the affairs of men that taken at the ebb leads on to the poor house.

A Society with a staggering load to carry can grow faint from malnutrition, and be compelled to throw over part of its load, just the same as a famishing camel in a desert. When societies for the good of mankind find that they have undertaken more than their support will sustain, they must lop off something or go down.

Last January the Zoological Society gave ample notice that as now supported it is overloaded, and can not carry on without the annual income of \$2,000,000 more of endowment. The most serious and overwhelming trouble is the actual financial inability of the City to provide the \$300,000 of annual maintenance money that the Zoological Park imperatively demands in order to live, and maintain its high reputation. We may just as well accept the fact that under the present strained financial situation, and the high cost of city maintenance, the City positively can not furnish the full amount of funds that the proper "maintenance of the Park, its buildings and collections" actually requires. The Society must help out further by new

means, or else greatly curtail its program of activities.

We could easily set down in mournful array the items of our annual financial shortcomings; but why carry out a harrowing tale to six decimal places? It is proper to say, however, that the two largest and most imperative claims upon the Society are found in a \$30,000 shortage in annual repairs and replacements, and about \$20,000 for pensions and additions to the painfully inadequate salaries of the Zoological Park force of 146 persons, and others at the Aquarium.

Every man of large affairs knows that men can not do their best in difficult work while they are continually harassed in mind by poverty in their homes. Nor can "the finest zoo in the world" be permitted to acquire a bad name through visible dilapidations in buildings, dens, aviaries, walks, forests and planting.

Of the scientific, educational and exploration work of the Society there is space here to speak of one thing only.

Few persons realize the enormous reach of the Zoological Society, its officers and its collections in educating the millions of American people in wild life lore. The influence of the Zoological Park and Aquarium, and the Tropical Research Station, that is exerted broadcast through the press alone—and now of high grade quality—is worth annual sums far beyond their whole cost. This fact has been accorded special recognition by Mr. Rockefeller's investigators.

Of all the great institutions for the benefit of mankind, the creators of the Rockefeller Foundation are among the most wise and judicious in avoiding the bestowal of support upon trivial or unworthy objects. After a very searching investigation by trained experts, and a comprehensive report on the Society's purposes and activities, Mr. John D. Rockefeller, Jr., quickly and generously bestowed upon the Society a gift of \$1,000,000, or one-half of the fund required. One-half of this was given outright and immediately, and the other half is made contingent upon the raising of \$1,000,000, from other sources.

Best of all, no "strings" of any kind were attached to the gift. The income is left absolutely free, to be devoted to the urgent needs of the Society as they develop from day to day and hour to hour. The report of the expert examiners stated with perfect truthfulness, "The Society is very poor!" Now, if any power on this earth could induce the City of New York

to make the annual Zoological Park maintenance fund just a little less than like an iron-clad straight-jacket, what a benefit it would be!

Closely following the splendid action of Mr. Rockefeller, Mr. Edward S. Harkness made a gift of \$100,000, and the will of our beloved Mrs. Frederick Ferris Thompson gives us \$50,000 more.

These accumulations are distinctly of a life-saving character. They come to us as comes to a man on a rack the sound of an order to "slack up."

But we need, and we must have within ten (10) short months, the awful sum of \$850,000 more! We need subscriptions in four figures, five figures and six figures! And the worst of it is:

We can not carry on without them!

If you like the record of the Society, if you are pleased with the Zoological Park and its men, if you approve the Aquarium, and if you are proud of the achievements and the fame of the Tropical Station, do we need to say more?

MR. CARL E. AKELEY'S AFRICA BOOK

Mr. Akeley, the famous sculptor-taxidermist and explorer of the zoology of Africa, has written a book of lively interest and permanent value. "In Brightest Africa" (Doubleday, Page & Co.) is, in general, a sketchy autobiography of the author, but in one of its details it is an excellent exhibit of the actual form, habits and surroundings of the wonderful East African gorilla. During at least fifty years of earnest striving, much blind groping and some horrible blundering on the part of travelling collectors abroad and taxidermists at home, the gorilla has been a helpless victim. Of all the horrible mounted animals of the world's museums, some of the "stuffed" gorillas may be reckoned the worst.

Theodore Roosevelt would have rejoiced, as we do, in Mr. Akeley's shrewd and careful gorilla observations, his field work, and finally his results. At last Africa's most wonderful mammal has been vividly put upon the zoological map of the world. Of course there are many details to be added later on, but the photograph of the recently mounted Mikenos monster, on page 191, will delight all seekers after the truth in gorilla form.

To the grand army of vertebrate zoologists and students of animal intelligence, Mr. Akeley's volume will be of keen interest.—*W. T. H.*

New York Zoological Society



OBJECTS OF THE SOCIETY

¶ A PUBLIC ZOOLOGICAL PARK. ¶ A PUBLIC AQUARIUM. ¶ THE PRESERVATION OF OUR NATIVE ANIMALS. ¶ THE PROMOTION OF ZOOLOGY.

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Departments:

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<i>Birds</i>	<i>Reptiles</i>
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WILLIAM BEHRER.

Director of Tropical Research and Honorary Curator, Birds

Each author is responsible for the scientific accuracy and the proof reading of his contribution.

VOL. XXVI NOVEMBER, 1923 No. 6

W. H. D. LE SOUEF

The many American zoologists who became personally acquainted with Mr. W. H. Dudley Le Souef, Director of the Zoological Gardens at Melbourne, on his visit to America in 1907, will learn with regret of his death at Melbourne on September 6, 1923. His untimely passing was largely due to an attack that was made upon him by two bandits actually within the precincts of his zoological garden, in the course of which he was severely and permanently injured.

Mr. Le Souef was one of the most noted of the Australian zoologists. His book entitled "Wild Life in Australia" is a valuable contribution to zoology, and is to be prized both on account of the wide variety of the subjects that it touches and the extent of the author's personal observations. Members of the Zoological Society will recall the admirable paper on "Mammals of Australia in the Zoological Park" which Mr. Le Souef contributed to "Zoologica" in January, 1919.

Mr. Le Souef was a prominent member of the Australian Ornithologists Union and enjoyed the acquaintance and esteem of zoologists all around the world.

WILD LIFE EXTERMINATION NOTES

A New Campaign.—The Permanent Wild Life Protection Fund, charged with the campaign work of the Zoological Society, will soon complete an acid test of the sentiments of the sportsmen of America toward its campaign to reduce by one-half the annual killings of game in the United States. Already it is evident that only a small percentage of sportsmen favor such a measure, or regard it as necessary. In October a long-contemplated campaign for a universal "reform game law" was inaugurated by the issue of an illustrated poster entitled "OUR VANISHING GAME." One side is devoted to pictorial exhibits of actual bag limits with explanatory text, the other to "THE ENEMIES AND DESTROYERS OF OUR GAME." Fifty prominent conservationists are being invited to become leaders in this campaign. Copies of the poster will be supplied to members of the Society on application to Dr. W. Reid Blair, Zoological Park.

The Automobile as a Game-Destroyer.—The showing in NATURE MAGAZINE for September of the automobile as a game-destroyer seems to have jarred the public considerably. The reaction of the newspapers, magazines and reviews was rather unexpected. It was the photographs of cars in many lands loaded down with slaughtered game that conveyed a real impression of the work of the new Car of Juggernaut. The estimate that the use of the automobile in hunting has increased the perils of game by 50 per cent, has not yet been challenged.

That "Gulf Coast Club."—Mr. Edward A. McIlhenny, until now supposed to be a bird "conservationist," in spite of his long record as a duck-shooter, has astonished (but not dismayed) all bird defenders by suddenly launching a gigantic scheme for locating a 4,000-member shooting club in Louisiana in the space of coastal swamp between the two Louisiana State Game Refuges. It will be remembered that those great sanctuaries originally were purchased by Mrs. Russell Sage and the Rockefeller Foundation, in 1912 and 1914, at a total outlay of \$383,500. The area of land to be

owned and shot over by the McIlhenny Gulf Coast Club is said to be 100,000 acres; and the fee for club membership, of \$1,000, makes the organization strictly a rich man's club. The membership campaign is being worked by "a large sales corporation," 100,000 copies of a costly and beautiful "club book" have been printed, and the money behind the scheme seems to be unlimited. The *Christian Science Monitor*, of Boston, calls it "Money Bags vs. Wild Game."

Vigorous opposition to the founding of the proposed death-trap for sanctuary wild fowl has been expressed by Governor John M. Parker, of Louisiana, the Sage Foundation, the Rockefeller Foundation, the New York Zoological Society, the Pennsylvania State Board of Conservation Commissioners, the Massachusetts Fish and Game Association, the Permanent Wild Life Protection Fund and the American Bison Society. Mr. McIlhenny and his club have been strongly condemned editorially by the *New Orleans Item*, *Outdoor Life Magazine*, the *New York Tribune*, *Times*, *Herald*, and *Sun*, the *Boston Transcript*, the *Christian Science Monitor*, *Pittsburgh Post* and *People's Home Journal*. The club is heartily endorsed by *Field and Stream* and by *Forest and Stream* as a "great conservation" movement—which is what Mr. McIlhenny diligently advertises it to be; but the latest and most thoroughly revised edition of the Advisory Board list is noteworthy on account of the names of prominent American conservationists that it does not contain. With only one exception, they are all conspicuous by their absence.

The two New York Foundations rely with confidence upon Governor Parker and the people of Louisiana to prevent by law the death-trap proposed, and the Governor is quite ready to ask the legislature to enact a new law to that end, if a new act is necessary.

Mountain Goats Accused.—The white mountain goats of the Bitter Root mountains, Idaho, living above and nearest to the settled region that for several years has been afflicted by spotted fever, are in great danger of annihilation. In an evil moment a local state investigator found some of them inhabited by the wood tick that is believed to carry spotted fever, and therefore the death of the goats is demanded. Unfortunately there is no attorney for the defense, no expert testimony in behalf of the accused, and therefore, on the strength of the one-sided case of the prosecution, the latest

word is to the effect that the Idaho State Game Warden has reluctantly been forced to consent to the slaughter of 20 of the goats.

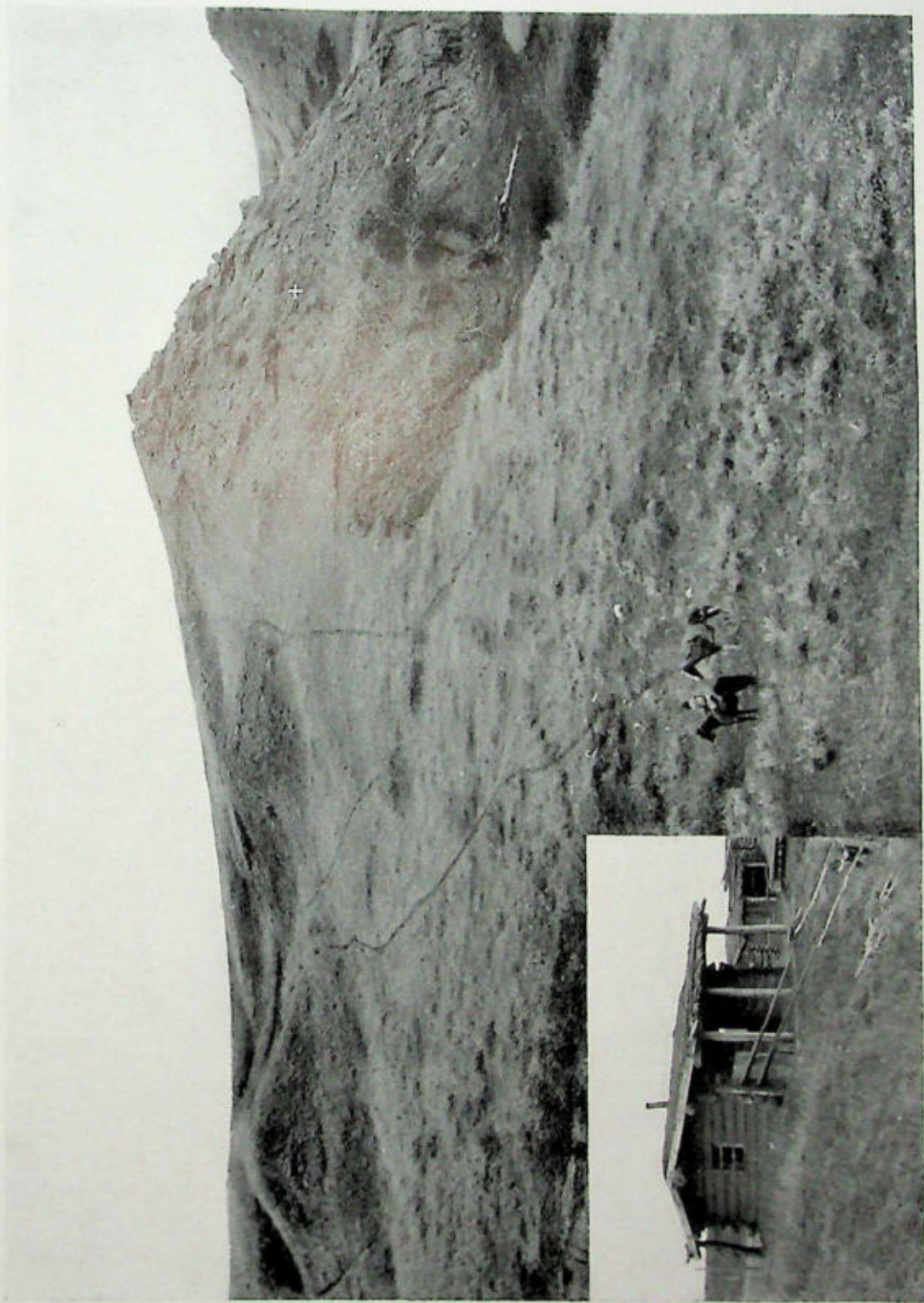
We are free to say that we are tired of the prosecution of one-sided cases against accused wild animals. Those 20 goats are being railroaded to their execution as criminals without adequate counter investigation and defense. Because some of them have upon them ticks of the same species as the alleged spotted fever tick, they are adjudged by a packed jury as necessarily guilty. In any court of law such evidence against men would have no standing whatever. The affair thus far is highly unsatisfactory.

At this point it is well to place on record the attitude of the Montana State Sportmen's Association, as expressed by its governing board in the following carefully considered statement which we have received from Mr. M. S. Carpenter, Secretary:

"We, as members of the above named board, not only do not object but heartily approve the taking of such measures as are necessary to drive the goats from the tick infested areas. We favor and recommend enlisting the services of the United States Biological Survey so that experienced and efficient hunters may be secured to drive the goats from the tick infested areas as proposed. We believe this movement should be kept on a strictly scientific basis, and are opposed to any general hunting of goats by sportsmen or others, and any aspect of commercialism being connected therewith. We feel that any goats necessarily killed in connection with this movement should be utilized for further scientific research, and that a summary of the results of this movement be made available for the members of the Fish and Game Commission."

Canada Will Kill Surplus Bison.—The impending killing of 2,000 surplus bull buffaloes by the Canadian government from its huge herd of 8,000 head at Wainwright, Alberta, is quite in line with our expectations. A show herd of that size can not go on increasing forever with no thinning out. The number that it has been possible to give away for educational purposes has been negligible. The footing of the American bison now is so secure that in certain large herds it is necessary to utilize some of the surplus product of good meat, skins, robes and heads for mounting. We are glad to know that this point has been reached in the come-back of the buffalo.

W. T. H.



TYRANNOSAURUS BUTTE ON HELL CREEK

The white cross shows approximately the location of the type specimen. Old buffalo trails are seen converging toward the water hole.

Inset, Max Sieber's cabin.

Photograph by L. A. Huffman, Miles City, Montana.

THE HOME OF THE TYRANT DINOSAUR AND TRICERATOPS

By WILLIAM T. HORNADAY

YEARS ago, I often wondered how small and puny men find the skeletons of gigantic but deeply buried fossil animals; and now I know how one came to the light of Today.

Once upon a time, in company with Mr. Laton A. Huffman, the great wild-west photographer of Montana, I blundered into a western wonderland, and participated in the discovery of a new land of dinosaurs. We were headed, in that glorious October of 1904, for a land of mystery vaguely known as "the Hell Creek country"; but half way there from Miles City northward, at the ruins of the old L. U-bar ranch, James McNaney, our guide, was precipitately called back to his home by illness in his family. The rest of us journeyed on northward, to and beyond Jerdon (then a place of four cabins only), missed our Cramer ranch goal, and finally achieved a state of being lost.

Finally, as our teams pulled northward we topped a divide, and toward the north a great panorama of picturesque bad-lands burst upon us with a resounding crash. As soon as we had recovered from the shock, we decided that no matter where Hell Creek was, or was not, that was good enough mule deer country for us, and in it we would seek our fortunes. My chief object was to find out precisely what the mule deer of that region were feeding upon at that season.

We drove forward on a dim wagon trail, determined to follow it until it ran into the ground; and at last it did so, at an artistic and picturesque Swiss-chalet log cabin. It was the house of a hermit wolf-hunter, named Max Sieber, and after Mr. Huffman succeeded in convincing him that we were not cattle men, and were not seeking to locate a rival cattle ranch, old Max took us to his heart, which was very much to the benefit of the parties of the second part.

His cabin almost overhung the upper water-hole of Hell Creek! Opposite, from the bank of the creek was an isolated conical butte, which contained a great secret.

We pitched our comfortable Sibley tent in a beautiful bend of the dry stream, about two hundred yards below Sieber's cabin. The spot was charming. There was aromatic sage-brush planting around our tent, behind us a cut bank of nice, clean sandstone, and a niche with a

live horned owl for a saint in it. In front of us was a thin fringe of yellow-leaved cottonwood trees winding along up to that conical butte.

With a mind filled with memories of the old buffalo days, Mr. Huffman quickly discovered a number of fossil buffalo trails cut into the earth, coming down from the grass-covered mesa on the east, and converging on the water-hole. They claimed the first of the 8x10 plates, for auld lang syne.

From a place on the edge of the mesa, half a mile northwest of the ranch house, there was a magnificent panoramic view of the bad-lands of Hell Creek and Snow Creek. For our own convenience we began to call it Panorama Point, and the pictures that Mr. Huffman made there, looking towards the Missouri River, only twelve miles away, already have gone down in history.

As our sample picture shows, the level mesa that once extended twenty miles to the bluffs north of the Missouri, built on what once was the bed of a lake or a sea, has been hacked and gouged by our old friend Erosion into a grand labyrinth of canyons, ravines and deep coulees, on which abound and abut a maze of benches, bluffs and cathedral walls. The building material is either smooth sandstone, or hardpan, or "flinty concretion." The color of it is Naples-yellow gray, and the ornaments are a very little common sage-brush, narrow-leaved mugwort and white sage.

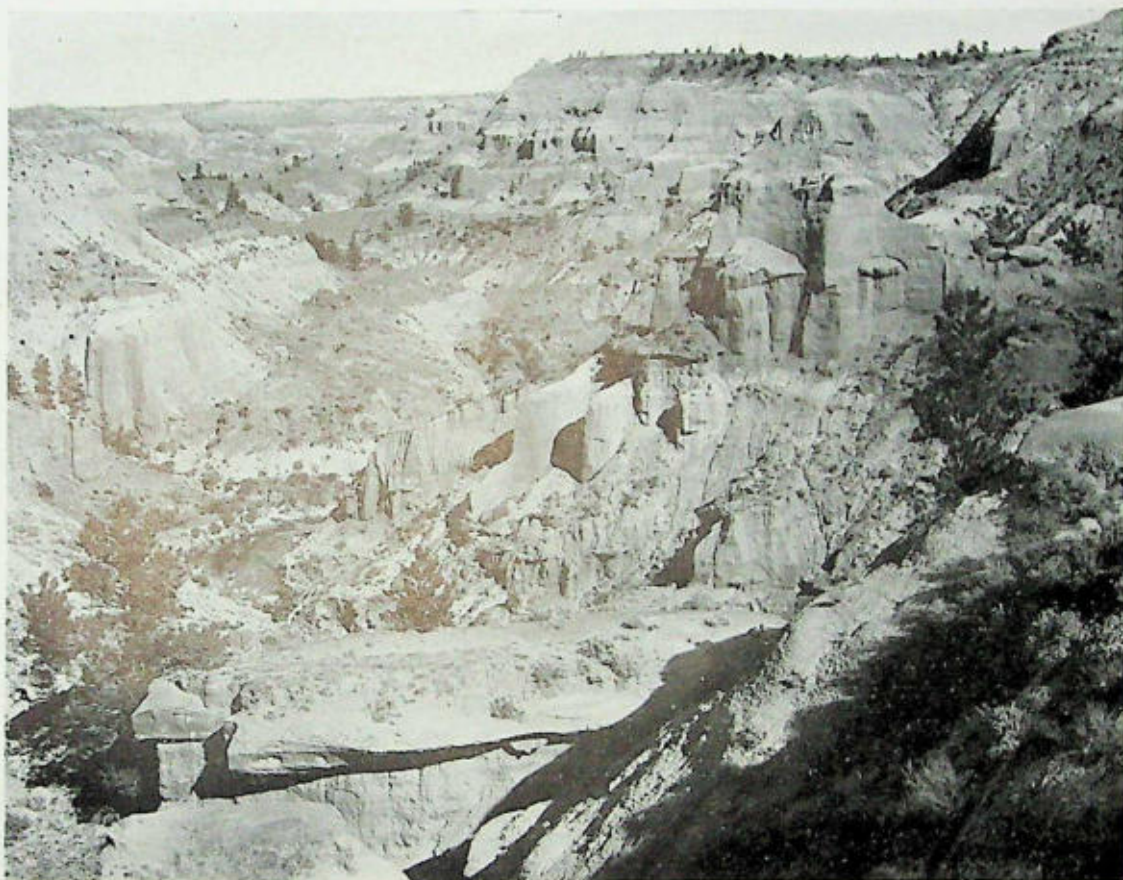
The depth of that carved-up mesa, from its hurricane deck down to the water level of the Missouri, I do not know. I dare not guess at it, because the descent is so irregular and deceptive. It may be 600 feet, and I really think it is. Certainly, the valley is as deep as the Washington Monument is high, and that is 555 feet in the clear.

On the mesa eastward of Sieber's cabin there rises a very nice collection of buttes—"sugar-loaf," "haystack," "saddle-backs," and so on. They surround a level and barren central plaza of a square mile or so, which presently we proceeded to cross in our quest for mule deer and bob-cats. Out in the exposed center of that bare plain, we came upon a large rounded object not down in the program, which gave us pause. It was the hopelessly weatherworn and shapeless remains of what once had been a large



RESTORATION OF THE KING OF THE TYRANT DINOSAURS (*Tyrannosaurus rex*).

On the right a family of Three-Horned Dinosaurs (*Triceratops*).
Restoration by Charles R. Knight. Reproduced by courtesy of the American Museum of Natural History.



THE PICTURESQUE BAD-LANDS OF HELL CREEK

Photographed by L. A. Huffman from Panorama Point, twelve miles south of the Missouri River.

fossil skull, seemingly as big as the skull of an Indian elephant. There it lay, free and clear, on the surface of the blasted ground, but alas! so weathered that its own father could not have recognized it. I could think of nothing that it might have been save my first impression—elephant.

For the moment the mule deer objective was forgotten. Max Sieber was surprised by our interest. "Had any fossil hunters been in that country in his time?" "No, not one." "Have you ever found any other fossil remains than this?" "Yes, I have some queer things at the cabin that I will give you—since you are so interested."

Sieber gave me some broad rib fragments, and a stone horn of a kind that I could not name, all of which I took back to New York.

On reaching home I lost no time in reporting to Professor Henry Fairfield Osborn that we had discovered a new fossil bed, and in advising

him to send to it a good collector. As to the horn-like thing he said immediately:

"That is the front horn of a Triceratops!"

The great three-horned dinosaur! It was one of the thrills of my life.

At the earliest practicable moment an experienced fossil hunter, Mr. Barnum Brown, was sent to Hell Creek, and to Max Sieber. That locality was thoroughly searched and soon yielded an astounding result.

It is the way of a fossil hunter in a land of bluffs and buttes to search closely along the bases of walls and steep slopes for fragments of fossil remains that have weathered out and fallen down. At the base of the conical butte directly across the creek from Sieber's cabin, and forming a part of the steep bank opposite the water-hole, the hunter found fragments of fossilized bones. It was evident that they had fallen from the steep side of the butte, higher up. Following this trail, about half way to



A RELIC OF THE EARLY 80's.

Buffalo hunter's cabin on Hell Creek, at the edge of the grasslands, with a typical butte in the distance.
 Photograph by L. A. Huffman, Miles City, Montana.

the top of the little peak, Mr. Brown located huge fossil bones, firmly embedded in "flinty-concretion" rock, and overlaid by many feet of sandstone.

It was the "King of the Tyrant Saurians," now famous throughout the scientific world as the type specimen of a new genus and new species of giant carnivorous dinosaur, the largest of all such, christened by Prof. Osborn as *Tyrannosaurus rex*.

Max Sieber's conical butte yielded the complete hind legs, pelvis and skull of the type specimen as these members now stand mounted à la life, in the American Museum of Natural History. It is about 12 feet from the top of the pedestal to the top of the pelvis. The skeleton's hind legs look very much like the legs of a gigantic ostrich.

In a case near by is a magnificent skull of this Tyrant Dinosaur, 4 feet long, about 30 inches wide and 36 inches high. The jaws are set with a terrifying array of teeth, shaped very much like the largest teeth of a crocodile, and the largest teeth measure five and a half

inches outside the jaws. These jaws and teeth must have taken out of the helpless herbivorous dinosaurs on which they fed, about 50 pounds of meat at a single bite.

But the most astounding specimen remains to be mentioned. Also in the Museum, and near by this type, stands an adult and complete mounted skeleton of this giant reptile. It is 18½ feet high, and 47 feet long! It stands erect on its huge hind legs like a stupendous kangaroo, but were it alive today, it could eat kangaroos of all sizes by the dozen, just like picking cherries.

Yes, my Triceratops did live on the old Hell Creek lake bed, along with the Tyrannosaurus and probably the Duck-Billed Dinosaur. Both the first and the last were herbivores but the Triceratops was far from being defenseless. His two rear horns had good calibre and penetration, and they pointed forward absolutely right for puncturing the abdominal balloon of a hungry Tyrannosaurus. I will guarantee that on many occasions those horns rendered excellent service in promoting the survival of Triceratops against his savage enemy.

As a guess that costs nothing, I should say that a full-grown Tyrannosaurus must have weighed on the hoof about 7,000 pounds. This genus lived in the Upper Cretaceous period, about 4,000,000 years ago. It was the largest carnivorous land animal that ever lived—at least so far as the rocks reveal the animals of the world. And to think, that at least one of them, and at least one Three-Horned Dinosaur, hung out right at Max Sieber's cabin, only 600 feet away from our Sibley tent where our one unterrified great horned owl sang to us from his saint-like niche in the sandstone cliff that half encircled our camp!

TO A FUR SCARF

By FREDERIC F. VAN DE WATER
In the *New York Tribune*

The trap jaws clanked and held him fast;
None marked his fright; none heard his cries.
His struggle ceased; he lay at last
With wide, uncomprehending eyes,

And watched the sky grow dark above
And watched the sunset burn to gray,
And quaked in anguish while he strove
To gnaw the prisoned leg away.

Then day came rosy from the East,
But still those steel jaws kept their hold,
And no one watched the prisoned beast
But Fear and Hunger, Thirst and Cold.

Oppressed by pain, his dread grew numb;
Fright no more stirred his flagging breath,
He longed in vain to see him come,
The awful biped, bringing death.

The day flapped past on heavy wing,
He saw the shadows longer grow,
A hopeless, wracked and dying thing
Encircled by the trampled snow.

Then through the gloom that night came One
Who set the timid spirit free.
"I know thy anguish, little son,
So once men trapped and tortured me."

New Big Game Protection In Mexico.—The January issue of *Nature Magazine* will contain the story of the interesting coup of President Obregon for the saving of the mountain sheep, antelope, Cedros Island deer, and elephant seal of Guadalupe by long closed sea-

sons, and complete immunity from slaughter. The Permanent Wild Life Fund is lending a helping hand by maintaining in northwestern Sonora, a thoroughly good game protector, Mr. Ben H. Tinker, of Tucson, who has been regularly commissioned by the Mexican government as an "honorary game guardian." Mr. Tinker is patrolling the 150 miles of international boundary, and the game country southwest thereof, that lie between Sonoyta and the Colorado River. This arrangement will continue for two years.
W. T. H.

Successful Acclimatization of Hungarian Partridge.—The following is an extract from a letter written by Mr. Philip C. Locke, of the Manitoba Game Protective Association, Winnipeg, to the Director of the Zoological Park on November 2nd, 1923:

"I suppose you have heard from time to time of the Hungarian Partridge in Alberta. This bird has been a great success, and has become thoroughly acclimatized. It has spread north into the Peace River country, east into Saskatchewan, south into Montana, and west into British Columbia. The Manitoba Game Protective Association is this month importing some fifty pairs of Hungarians, which are to be wintered at one of the Experimental Farms owned by the Government, and to be planted in various parts of the country early next Spring. If we have even a small portion of the success that they had in Alberta, it means the introduction of a new game bird into the Province."

MEMBERSHIP OF THE SOCIETY

The following persons were elected members of the Society, March and October 10, 1923, by the Executive Committee:

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DEPARTMENT OF
TROPICAL RESEARCH
OF THE
ZOOLOGICAL SOCIETY

Contribution, Number 162



JACKING FOR YAPOCKS

By WILLIAM BEEBE

THE Yapock is an aquatic opossum, with normal hands and huge webbed feet. It is the most beautiful of all opossums, as large as a very large rat, with soft silky fur and a double dumbbell pattern of delicate gull grey on a background of purest white. It is also one of the rarest of mammals, both in actual specimens and in our knowledge of its life and habits. I learned of a tributary of the Chagres where twenty-five of these beautiful little creatures had been collected and others seen, and so under a blazing two o'clock sun we set out—my hunter friend and I—to spend the night in the tropical swamps of Panama.

We landed on a beach of coral and shells and walked through a grove of cocoanut palms, with plumes as graceful and delicate as smoke, and on through the back yards of mighty gun emplacements. Topping a ridge and down into steamy greenness took us from sight of man and his works, except that for a long time we crossed and recrossed narrow ditches draining the land of mosquito water.

Finally we came to low jungle and for a mile or more followed a dim trail. It may have been begun by wild animals, it was assuredly widened by Indians, and we know for certain that old Henry Morgan and his horde of buccanniers used it, and today it is passable for a horse. But Yapocks lived far, even from this trail, and we soon launched out at a left angle straight into the jungle. Sometimes we were helped by a long stretch of shallow water; again we had to creep ant-wise through a solid mass of agave, moving each thorn-lined leaf to one side, and paying for each misstep with shreds of clothing and drops of blood. In the centre of each plant rested a great scarlet bloom, a foot across, its re-

flexion turning the heart leaves to a rosy pink, but its beauty was hardly compensation for the cruel gauntlet of spines. In the intervals between the zones of spines, more active, zoological thorns sought out unexpected places, and Azteca ants drove home their stings with enthusiasm. Soon we moved in an aura of formic acid emanating from those we killed. Two miles and a half of this going brought us to a ridge where we could look into clear sky, and hear the deep distant note of a Royal Mailer calling for a canal pilot.

Down into a new stream we went, with its current towards the Chagres, and listened to evening flocks of parrots and heard the swish of vultures' wings as they took a last look at us, before despairing of our early demise. Doves boomed at their water holes, motmots mumbled converse deep in side gullies, *uh-huh! uh-huh!* and tree-creepers' beaks dripped silvery cadenzas.

The *kr-ump* of a big gun came from the distance, but in place of an echo, there followed a still deeper rumble and we knew that the eight months of rain had begun. The jungle as a whole was green—the heavy nightly dews saw to that, but hosts of flowers and insects were waiting for the first downpours to stir and develop and fulfil their destiny.

After about six miles of gruelling pushing through jungle which was more like story-book jungle than is usual in the tropics, we reached Yapock country and sat down on a great flat expanse of stone, smoothed by the torrents of hundreds of rainy seasons. Here we ate our army rations and talked of past hunts with Indians and Dyaks, of silky anteaters and flying lemurs, of cat-bears and kinkajous, and always we came around to Yapocks. As we sat there by the little river, the light softened and



SKIN OF ADULT WATER OPOSSUM OR YAPOCK

The remarkable pattern is plainly shown.

greyed with mist, and a complete circle of songs closed in upon us. They were antbirds, but wholly invisible in the dark undergrowth. The sweet dropping notes trickled continually, as if a score of tiny rills were tinkling down rocky ways toward us.

Up stream a wide slope of mossy rock stretched from bank to bank, with the dry season brook confined to a deep, even-sided trough down the centre. Everywhere were geometrically rounded potholes bored straight down into the rock, many dew or spray-filled, to the rims of which came occasional green midget kingfishers, who clicked at us, then dived, caught something too small for us to see, and finally flew on around the bend.

As I looked, a long-tailed lizard rushed out from shore and stopped, body flat, head and neck high arched. It made its way with quick sudden rushes across the open, snatched some titbit now and then, and, to my delight, became a biped at each rush. The first step took it up on finger tips, and then a short distance farther, its forelegs rose clear, folded close to its breast, the tail upraised, and I saw before me

a tiny dinosaur speeding toward the opposite bank.

With a warning grunt my companion reached slowly for his gun, looking behind me and downstream. Like a well-trained setter, I slowly flattened, rolled over and froze, and saw a good-sized, stoutly-built otter nosing over the open rock where we had passed. She was suspicious, and with dim, water-flattened eyes looked in our direction, striving to make us out. We secured her, *Lutra repanda*, and found she measured thirty-eight inches in length, full-grown but not breeding, with long flattened tail, and most excellent fur for a tropical otter. I traced her back and found that while she had slid gently down a steep bank, yet further on she had been in the river bed. In fact her food showed that she must have been feeding for a considerable period of daylight before we saw her at six o'clock. She had caught many small fish, mostly the dark mancholas, so abundant here, together with many shrimp and catfish.

The subdued report of the small collecting gun had no effect on the antbirds' chorus, but as the dusk settled down, they thinned out, not weakening with distance but silencing one by one. Before the last ceased, a new sound arose

a few feet away, an ascending, liquid *whoop-eeep! whoooeep!* and the burden of song passed from the sleepy antbirds to the awakening world of small frogs.

Even the relative proximity of the canal and the batteries and human beings was forgotten when some jungle cat—ocelot or jaguar—snarled twice upstream, and this was reinforced by a muttering roll of thunder and a stray, momentary breeze which shook every leaf. In the last ten minutes of daylight I saw two nests overhanging the water. I reached the first and found it an old hummingbird's home, fashioned of cottony seeds, which were fraying out, and drifting a second time to earth. The other was a yellow flycatcher's pinch of tide-drift and it was shaking when I first discovered it. Before I reached it, a lizard shot forth and along the branch. It too was empty of eggs and old.

Night came with a rush and we hastily made all our preparations for darkness. My jack was electric, my companion's an acetylene bull's eye which buckled around his forehead. After this our world consisted of the tiny circle which our shaft of light picked out on water, rock or foliage. All else was impenetrable, absolute darkness—apparent to us only through its feel, its sounds and smells. We had no lack of variety as regards the feel, for we worked up and down short stretches of two streams and connected each likely Yapock zone with longer or shorter trips through dense jungle. The potholes, so distinctly outlined in the daytime, now merged with the slippery water-covered stone and each step must be felt, or chances taken of a plunge. When once wet to the skin, we cut small holes in our pockets and haversacks to drain out the water and sought only to keep jack light and gun above the surface. Later when it began to rain we ceased to worry even about that. To all intents and purposes we became Yapocks ourselves, and however little I knew about them, I at least have shared many of their feelings. The air and water were of equally pleasant temperature, every moment was filled with driving interest, and every coming second with potential discovery. During one spell of watchful waiting I tried to think of some place in the world more preferable—and I failed.

The pothole contingency was objectionable only because of the uncertainty of depth and diameter. If one plunged deep into a narrow hole and fell sideways a badly sprained ankle would result, and the inability to arrange correlation of muscles for a drop which might be six inches or six feet was trying. Early in the

night I stepped out of the shallows on to a short, half submerged log, when the log turned into a steel spring, which flicked me backward into a seven-foot pothole. When I climbed out, my companion said that to the best of his knowledge the youthful crocodile which had exploded beneath me, was still barging full speed down stream, even more startled than I. As for me, in spite of many past experiences I had still been trying to keep my solar plexus dry, using much valuable effort to this useless end, and now I was equally and pleasantly soaked all over, and throughout the rest of the night, wasted no more thoughts on adventitious dry spots.

Just as the source of all our visual knowledge came from the narrow circle of direct lighting, so the exact whereabouts of the living beings of the jungle was indicated by reflection—the pigment and rich plexus of blood vessels of the retina glowing like fire in the light of the jack.

We had hardly begun to move silently down stream when things occurred and were seen, quite otherwise than we diurnals know them. The change was casually initiated by the moan of an owl, the last sound before the young croc skittered me into the pothole. Beyond the upper part of a tinkling rifle a single glowing eye shone out, which never increased to two. After much peering, being rather nervous from my upset, my companion fired along his light shaft and bagged an unfortunate marine toad, which with a companion had come out upon the moss to seek for stray bits of food. His chagrin was great, for he had hunted with jack light over this region many times.

Ten steps more and I aimed at two points of light moving steadily over the rocks. Rushing over to the spot, and miraculously escaping a whole nest of potholes, I found that I had sunk still lower in the jack hunters' scale, and had dismembered a huge crayfish, which had been sculling along on the surface of a shallow pool.

We squatted silently and waited. The pool held four mancholas, elongated, mottled fish, sleeping quite soundly with wide open eyes, their bodies resting on narrow ledges, often with head and tail unsupported. Creeping over the bottom was a host of small shrimps, each with a glowing pair of stalked eyes, the pool appearing full of restless rubies. Close behind me, a pothole re-echoed with a cheerful *whoooeep! whoooeep!* and the jack turned gradually upon them caused no disturbance—it was to them merely the moon risen before her time. Flattened upon the surface were two male whooping frogs, *Euperiphix pustulosus*, pale brown, and each



HAUNT OF THE YAPOCK

Miles of thorny jungle without roads or trails protect the Yapock in its home.

physically and mentally nothing but a voice. Their bodies were distended until they looked like translucent, rounded jelly-fish. At two-second intervals, an enormous vocal sac bladdered out from the throat, almost equalling the diameter of the entire distended body, producing in the instant of its expansion *whoooeep!* and with its deflation, two or three curious, short, metallic, creaky sounds as if some part of the mechanism needed a drop of oil. The *whoooeep!* was the thing, the other merely an incidental noise. Sitting quietly upon a leaf was the object of their efforts—a small female, listening, stolidly, uninterestedly. In the same hole were many full grown tads and a single long-tailed polyfrog. One great tadpole blundered up to the surface for air, upset the female, who leaped against the pothole wall, the males collapsed and dived and the Batrachian tableau was over.

In other potholes were small piles of froth and gilled tadpoles, but the majority in both rivers were full-grown tadpoles, ready at the first downpour of the rainy season to take care of themselves. The frog chorus kept up steadily until the rain began to fall, when it grad-

ually died down. After a few minutes in one of my vials the male frogs turned olive-green and showed a sloth-like dorsal mark, a black circle with a heart of greyish white.

Before we had moved from the first spot we had the thrill of the trip. What had been in early evening a clear view upstream, was now only a black well, except when our slender shafts searched out rocks and riffles. With no warning of wind or distant thunder, there came five prolonged flashes of lightning. As if we had been expecting it, our eyes were focussed, our direction was perfect, and there, part way down the riffle were three opossums. One was a smaller edition of our Virginia species, and the other two were what we had come to see—Yapocks. The smaller had his back turned toward us and every flash of lightning showed the unmistakable pattern. The larger was in profile, sitting up on her hind legs, eating something, probably a shrimp which she held in her 'possum hands. About the third flash we rose and began creeping upstream, and by the fifth the animals had seen us and started for the bank, swimming a shallow pool beyond the riffle. When we came within shooting distance, nothing was visible except the miserable white

opossum, snarling as it backed slowly away over the rocks, avoiding the water, and showing not a fraction of the timidity of those we desired so much.

In addition to our disappointment, at the same moment we both fell into separate potholes, and then I climbed out and plumped into another. So we sat down to drip and drain and to post mortem what we could have done if we had brought a heavy gun.

At the next flash of lightning, I went on up river alone and found the pools so deep and continuous that I had to make my way along the bank under the overhanging foliage. Reaching out to help myself by swinging on a branch, I was startled to have part of the dry foliage tear out of my grasp and turn into a large lizard which scurried faster up the bark than my flash could follow. Examining the rest of the plant, I discovered five more basilisk lizards, out of reach, all asleep, or just awake and watching me, stretched out along the drooping twigs. Like *Polychrus* in Guiana these, and others which I saw during the night, were all lying head up, the long tails indistinguishable from the hanging ends of the twigs, the great expanses of casque, and frill and fins, all merging with the many dried and crinkled brown leaves still lining the branches. I think the flying dragons of Borneo are the only lizards I have ever seen more spectacular than these basilisks. At night, at least, they were of a rich, warm, leaf brown. From the back of the head rose abruptly a dark, backward curved casque. The body supported a long finlike crest, almost as high as the body was deep, and there was a third great dorsal fin on the proximal half of the tail.

The smaller bipedal lizards were wholly different in pattern and coloring, dark grey with yellow and white markings, yet they had the beginnings of the casque and the high fins. I saw none on the lower trees and bushes, except that in the flycatcher's nest, but they were quite common in daylight, feeding at the edges of the shallows, running, or swimming across the pools.

A bright pair of eyes in a place where none of the rest of the creature was visible was too tempting to resist. I was so close that I fired well to one side and ran up just in time to catch a white-eyed opossum by the tail as she was ambling off into the brush, *Metachirus opossum fuscogriseus*. One shot pellet had slightly lamed her, and made it possible for me to reach her. I bagged her, but not before she had well bitten

me, climbing unexpectedly up her tail to reach my finger. The next day she had completely recovered, fed heartily and snarlingly allowed me to examine the two large infants which remained in her pouch. Another had dropped out when I captured her and she refused to reinstate it.

As I squatted by the pothole I was aware of a heavy scent as of jasmine, which spread without any wind, and passed, with the atmosphere still breathless. Next I could distinguish 'possum scent and again the sweet perfume. Twice before during the night I had detected sudden, violent, very individual odors, as from invisible flowers which had just opened aloft.

Back I went to our first stand and then by agreement I started across for the second river. A last glance around showed a pair of shining eyes close to the riffle. No manipulation of my flash revealed any other hint, but the pale pink color at last made me decide to investigate rather than shoot. For my pride's sake I was glad, for the eyes did not move as I approached and finally pushed the flash within a few inches of a great grey ctenid spider, flat and with widespread, spiny legs, resting on the moist rocks for heaven knows what provender. Except for the slight difference in color, at a distance of fifty feet, the jack light showed up two of his eight eyes, quite indistinguishable from those of an opossum at twice the distance.

My companion returned. He had seen another Yapock but had overshot it, but had secured, to his disgust, an evil-smelling white opossum, which I kept as consolation, *Didelphis marsupialis etensis*. A hundred yards of crawling by intermittent flashes brought us to the second stream. We peered out from a screen of leaves, which in daylight were doubtless green, and close in front another white opossum quartered the rock like a huge albino rat, snuffling here and there for something edible. Beyond were two spiny rats, travelling slowly side by side, their eyes small and less distinct, their dark bodies curiously visible in our low swung light.

The life of the Yapock, *Chironectes panamensis*, is as great a mystery as its haunts are difficult of access. I found three separate entrances to burrows, easily identified by the numerous webbed and fingered tracks. The holes were about six inches in diameter and all well up under overhanging roots and banks, out of reach of all but the very highest floods. They led either straight in or slightly upward, but we could not get to the ends on account of

the interfering roots and stones. Between holes, and for some distance up and down stream, the animals had well-trodden runways, which occasionally turned sharply upward and led for a short distance through the undergrowth.

On one side of each entrance was a low mound, pounded hard by the pressure of the animal's feet and body, and scattered about, sticking in the soft mud, were veritable, miniature kitchen middens—remains of giant crawfish, *Maurobrachium jamaicense*, ancient heads of fish with occasional bits of vertebrae and fins. The flowing stream in front (and the holes invariably faced pools of considerable depth) provided an abundance of food, much of which was apparently brought up and devoured near the burrows. These opossums have as many as nine young in a litter, and even well-grown ones have been seen in close association with one of the parents. It is a mystery how the young can stand immersion, when the mother goes on her fishing excursions, unless during the helplessness of the early period of their existence she confines her hunting to shrimps in the shallows. Few naturalists have ever seen these creatures alive and my glimpse, meagre though it was, made me count my nocturnal adventure a success.

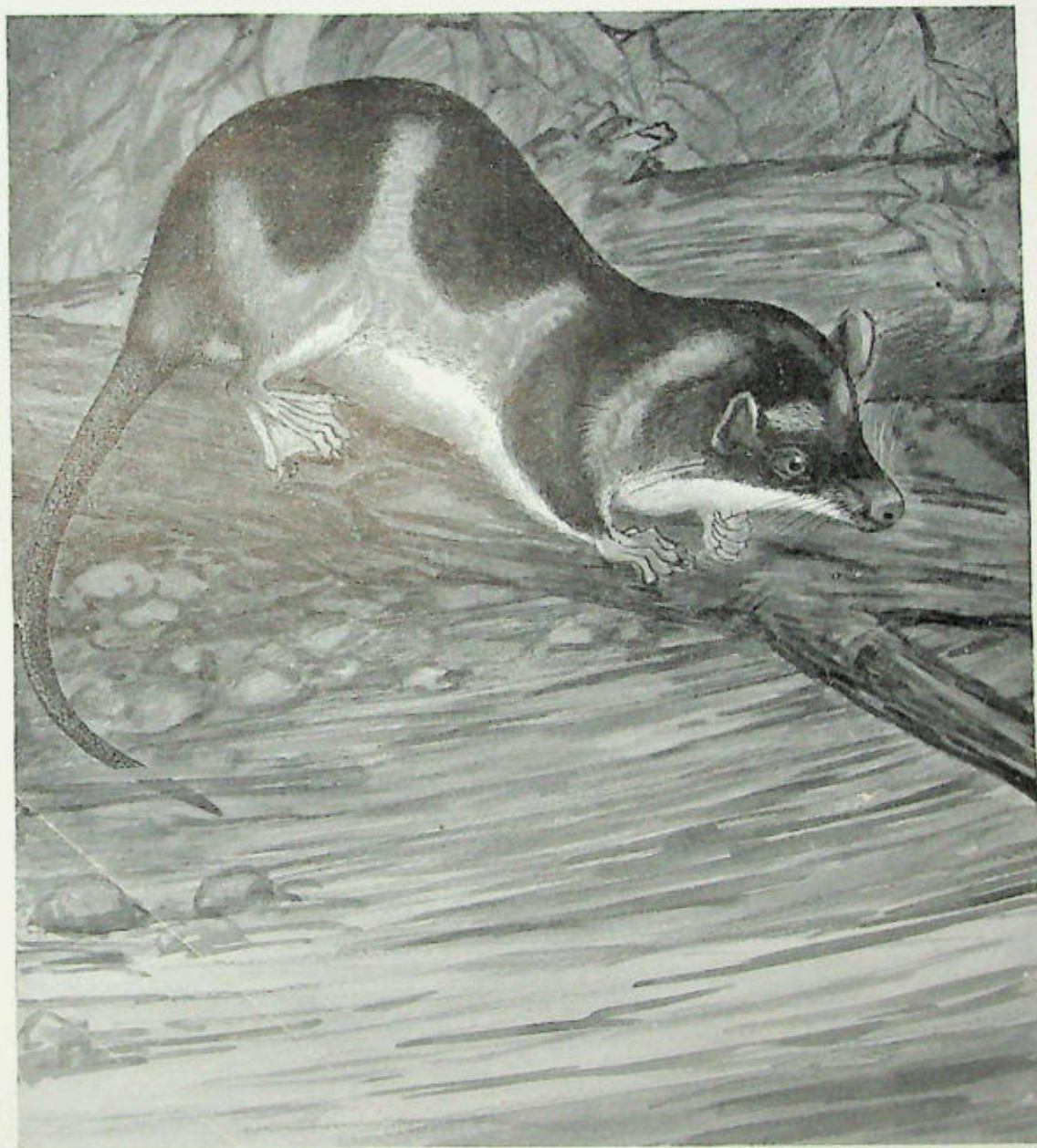
Finally came the wind and in another five minutes the rain. For a time it fell heavily and we saw an end to jacking, but after some glorious lightning and thunder, and another wild burst of wind, came steady, quiet, misty rain which interfered in no way with us. As we left the shelter of the bank, a great tree fell on the other river, and we wondered whether it was the dead giant which had overhung our dining rocks, and upon which we had commented, wondering how many centuries it had stood there, perhaps since Morgan passed, and how many minutes, or months or decades it would still resist gravitation.

The shallows of the second river alternated patches of soft green grass with smooth rocks, and seemed singularly free from potholes until my guide got careless and went up to his waist in a narrow one. We sat motionless on a soggy bank, flashing occasionally, when we both thought simultaneously of the two Yapocks on the first river, and rose to make our way to shore. We were in an inch of water on a wide expanse of rock as flat as a table, when my foot struck against a bit of stick. Flashing downward perfunctorily, I saw a heavy-built, five-

foot snake in the act of changing its course. My slight blow had turned it, and it was partly between my feet, winding slowly around toward its tail. The first glance showed me the swollen jowls, the x-shaped marks, and I thought fast. My first impulse was to press my flash down upon its neck, but the electric had been flickering during the last five minutes and if the water quenched it I would have to be very certain of my neck hold. My bags and haversack were far off on the other river and I remembered the thorns and slippery banks between; besides we were out for Yapocks. So I decided against toting a living, deadly bushmaster snake back, and called out to my companion who had the gun. He turned ready for a Yapock, and was astonished to see this great yellow and black form undulating toward him. Potholes did not concern him as he turned its flank and put two pellets through its neck. This rendered the snake helpless, but its fangs were a trifle over an inch in length, and I fastened the head very tightly in my handkerchief before I wound up and tied its sixty inches around my hunting belt. And on my way back, whenever its coils were unusually lively, and I simultaneously ran against a thorn, the combination tended unduly to excite the imagination, and I was not sorry when I could cache the big master of the bush farther from my skin. *These venomous snakes are apparently rare in this region, and this was the first which my companion had seen on the Isthmus in eight years of hunting.

When we returned we could see nothing but the more common opossums and rats, although a paca once ran across the shallows. It was half past two and although the rain-mist still came down, yet the diffused light of the hidden moon showed our figures to one another, which meant that the wild creatures could see us distinctly.

Disappointedly we packed up, and squeezing all the water possible out of our clothes, we began the slow, steady crawl and creep and scramble which is the only gait to be sustained through the long miles of dense thorn jungle. We saw not one mosquito the entire night, but from six to eight, and for a half hour later in the night, our jacks made a veritable mecca for all the sand flies in the world. During that time we breathed and swallowed and felt nothing but the millions of pests—eyes, ears, and nostrils were filled with them, and it was diffi-



YAPOCK OR WATER OPOSSUM, *CHIRONECTES PANAMENSIS*, GOLDMAN

From a water color drawing by Isabel Cooper.

cult to keep constantly from coughing and sneezing and so frightening the animals. When they did go, it was in the fraction of a second; one moment there were untold myriads, the next not one was any where near us, nor in the most distant part of our searchlight's path.

Near the end of our journey, after passing the sentry, we awakened our motor boatman, and

pushed off. Five minutes later I caught a white-eyed opossum with three young which had also gone to sleep in the boat and was doing a Marathon around the gunwale of her suddenly made island. An hour later the yacht loomed up in the mist and as I went down the companionway to my cabin, the first streaks of the new tropical day were spreading over the great canal.

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Giant mountain groundsel (*Senecio johnstonii*) in flower on Mt. Elgon at about 14,000 feet. Belonging to a genus of wide cosmopolitan distribution, it usually takes the form of a small plant, but here towers many feet above the author. The best known North American relative is our southern butterweed (*S. lobatus*). Near the Andean snow-line it also attains the vigorous growth the montane boreal rigor seems to foster.

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WILD LIFE ON AND AROUND MOUNT ELGON, EQUATORIAL EAST AFRICA

By LEON BAYER, M.D.*

Formerly of the Tropical Institute of Hygiene, Amsterdam

Illustrations from Photographs by the Author

PART II. THE ASCENT OF MOUNT ELGON

HIGH were our hopes of observing some really rare game when, on entering the forest our Ndorobo guide pointed to the fresh track of bongo (*Boocercus euryceros isaaci*). But, as these antelopes travel in small troops, it is well nigh impossible to get a glimpse of or approach such wary and elusive game in the dense jungle on the slopes.

Contrary to our expectations the ascent of Elgon was not as arduous an affair as we anticipated, for both Mahieu and I were in fine physical trim. Here and there on the slopes were troops of monkeys. Little did we think that from their number our first shot would secure for us one of our discoveries, *Cercopithecus leucampyx elgonis*.² Considerable interest was aroused as it proved to be related to the West African forest form rather than to its neighbor in Kavirondo.

The isolation of Mt. Elgon and its many caves offer unusual facilities for shelter to a fairly dense population. These natives are, as one might expect, for the most part a mixed crowd of fugitives escaped from the cruelty of ravaging oppressors, or else themselves bold robbers, differing much in race and language, especially those living in the many caves. According to rumor, the security these troglodytes derive from their hidden and inaccessible mount-

ain dwellings does not foster in them an over-anxiety to deal with great fairness with their neighbors. Their traditions also have taught them the value of independence. Yet in spite of all this the few we met appreciated our open-handed manner. Under the pacifying influence of British rule even these out-of-the-way regions have been greatly benefited and there is a tendency to leave the caves and settle in the open. The Elgon natives are partly agriculturalists and partly cattle herders. Their flat roofed huts, on a framework of sticks and leaves, are plastered over with layers of cow dung and remind one of similar Masai structures. The "Esomek" live in large and numerous caves of the first cliffs. There is no doubt they at least kill elephant, rhinoceros, giraffe, buffalo, hartebeest and even buck, but their depredations are comparatively occasional, being carried on by but a few of their expert hunters.

Whoever ascends Mt. Elgon can not refrain from speculating upon the origin of the many caves. Joseph Thomson, the first to discover them, believed they represent deserted mines of a vanished race that searched for minerals or precious stones. But, according to Dr. Chester A. Reeds,² this theory has no real foundation. These spacious recesses, generally situated at the base of sheer precipices of volcanic rock, are mostly screened by beautiful cascades

* Arranged for publication by Herbert Lang, Assistant Curator of African Mammals, American Museum of Natural History, New York.

¹ Lönnberg, *Rev. Zool. Africaine*, VII, 1919, p. 133.

² Associate Curator of Geology, American Museum of Natural History, New York.



The entrance to Mt. Elgon crater, which is about seven miles in diameter. In the left foreground the vegetation is mostly arborescent *Senecio johnstonii*. Mt. Elgon is supposed to be the largest extinct volcano in the world and was probably formed in the later Tertiary period. The highest peak is 14,140 feet above sea level. The great jagged rocks probably were covered at first with volcanic tuff which has been worn away by erosion, leaving only the harder parts.

of water. Some of the joints or fissures at the base of the abysmal terraces were steadily invaded by moisture collected above and along the precipices. But as the upper part of these fissures gradually become more undercut through the action of climatic influences and erosion the cave in getting bigger also became drier and more habitable. At times the natives themselves somewhat enlarged the dimensions of these rocky caverns. Some caves, of which there were about forty along our route, seemed to have their entrance barred by low, flat huts or by irregular palisades. Others were so roomy that a whole village filled but a small corner. To be led behind the vaporous curtains of the screening waterfalls and enter dry-shod the dusky realm of these homes was no small surprise to us. Even before we were accustomed to the stuffy atmosphere and the deafening reverberation of tumbling waters, our attention was captivated by the kaleidoscopic play of colors as one looked out upon the sunlit landscape through the spray. Lost in wonder as we were, the bites of numerous fleas which infested the layers of cow dung and other refuse

carpeting the floor brought us back to earth and once more to the subject of natural history. Some of these subterranean passages invite a host of bats, there being records of *Rousettus lanosus kempii* and *Scotoecus albigula*. Among the rodents attracted by these settlements is the giant rat (*Cricetomys gambianus elgonis*), measuring nearly three feet in length. There is a multitude of other creatures, crustacea, spiders, insects and mollusks, but we could not tarry longer.

At an altitude of from 7,000 to 8,000 feet we entered the zone of trackless bamboo brakes (*Arundinaria alpina*). Here elephants, buffalo, bongo, and the great black boar are still at home. But glorious is the sight above the bamboo belt. For a few hours the sun permits a clear view over the jagged rims left by the centuries of erosion after the last volcanic upheavals. In front of the bluish haze extend magnificent buttresses, deep gorges, luxuriant valleys, and placid lakes. The equatorial alpine flora is as remarkable as peculiar, and reaches nearly to the summit at 14,584 feet (4,445 meters). Below the loftiest elevations the slopes



Interior of a cave on Mt. Elgon. The "Engabuni" or cave dwellers, who live here, still spread the awe-inspiring belief of a strong monster living in a large cave high up in the mountains. They themselves however consider the mighty beast really small in size and attribute to it a beneficent influence over their cattle, of which they own many fine herds. Often a few of their flat huts actually close up the entrance to the cave. In other cases a whole village occupies but one small corner.

are covered with the quaint columns of *Lobelias* and groves of the equally strange arborescent *Senecios* (*Senecio johnstonii*). In the valleys below extend moist areas of a low tussocky formation. Still lower, and just above the bamboo belt, one finds the most enchanting part of the mountain. Stretches of the tree-forming heather with its silvery white flowers (*Ericinella manni*), bushes of *Alchemilla argyrophylla* with their silken, glittering leaves, the masses of ferns, graceful terrestrial orchids, and club-mosses, and the magnificent patches of everlastings, not to mention a host of other flowers, from a pleasant contrast to the velvety grayish-green of the dense carpet below. Particularly noteworthy among the everlastings is *Achyranthes hochstetteri* with its downy stalks of nearly four feet in height, the delicate pink blossoms of *Helichrysum elegantissimum* and *H. nezii*, which occur in abundance to the highest pinnacle of Elgon. Here in this dense, generally clustered vegetation is a whole world of smaller rodents.² For some time we followed

² *Otomys tropicalis elgonis*, *Mylomys cunninghamei*, *Lophuromys aquilus zena*, *Tachyoryctes ruddi*, *Graphiurus miccotis saturatus*, and *Lepus victoriae*.

a trail of buffalos at about 10,000 feet, but our attention soon shifted to a duiker new to science and since described by Lönnberg⁴ (*Sylvicapra grimmia lobeliarum*), which was hiding in *Alchemilla* bushes. We also flushed francolins, and at certain sites hares (*Lepus victoriae*) proved to be common.

Our Ndorobo guides and porters suffered sorely from the cold, damp air near the mountain top, but we were sorry to leave the grandeur of this solitude. While out for one last look we secured a hare which had hardly come to rest after tumbling over some rocks when a hawk (*Buteo augur*) perched itself upon the trunk of a nearby *Senecio*. Just then we noticed again on one of the *Lobelias* the beautiful long-tailed metallic coppery sunbird (*Nectarinia tacazze*).

For our descent we chose the eastern slope of the mountain for at the foot of that side we had left some of our men in charge of the base camp. Crystal clear brooks, imbued with the torrential forces of unbridled youth, awakened a thirst for speed within us that nothing could check until we were back on the caravan

⁴ Rev. Zool. Africaine, VII, 1919, p. 181.



On the plateaus between the lands of the fiery sun and the temperate mountain zone the caravan came across these low huts, made on a framework of sticks, twigs and leaves and plastered with layers of cow dung which sheds the rain effectively. These huts are similar in structure to those of the Masai and many are also built in the caves on Mt. Elgon.

road. A few days later we marched northward, still for some distance descending abruptly, into the Kerio-Suk country. Coming from the exhilarating mountain air, the temperature noticeably jumped steadily up in the lower lying regions. Game, however, was scarce. Buffalo and hartebeest occasionally came into view and also a troop of the stately roan (*Egocerus equinus langheldi*). Turning now to the right bank of the Turkwel River we cut east across the Suk range. At the Maroon River, an affluent of the Wei-Wei, a gerbil new to science (*Tatera nigricauda bayeri* Lönnberg²) was abundant. In the semi-desert, hilly regions between the Turkwel, Wei-Wei, and Kerio Rivers and beyond we again met game in fair numbers. The scanty thornbush vegetation, characteristic of so many parts of Eastern Africa, the open, arid stretches, the scrub on the slopes with dense jungle at the base of the escarpment, the more luxuriant stretches along the rivers, the numerous waterholes, the groves of bifurcate doom-palms, and the fringes of forest offer a livelihood to a great variety of wild

life. Troops of the straight-horned oryx (*Oryx beisa annectens*), grazing elands (*Taurotragus oryx pattersonianus*), restless Grant's gazelles (*Gazella granti notata*), and watchful hartebeest, sleek topi (*Damaliscus korrigum jimela*), loitering waterbuck (*Kobus defassa nzoiae*), swift impala (*Aepyceros melampus suara*), and troops of baboons are among the more common creatures. East of the Kerio giraffes and zebras (*Equus quagga granti*) again enliven the landscape, but one is only rarely rewarded with a glimpse of perhaps the most magnificent of all antelopes, the greater kudu (*Strepsiceros strepsiceros bea*). On the right bank of the Kerio we surprised an old male of the lesser kudu (*Strepsiceros imberbis*).

Black rhinoceros was more numerous at the base of the escarpment. Probably the tall, warlike Suk, who use parts of its hide as shields, do not pursue it into these strongholds. In one of their few habitual wallowing places I found a family of five warthogs unwilling to move into the parched plains. A little farther on, was another mire of considerable extent, but just in a state of drying up. In it elephants had sunk deep pits with their columnar

² Rev. Zool. Africaine, V, 1918, p. 179.



At over 9000 feet elevation on Mt. Elgon, the heather attains the gigantic size of more than fifteen feet in height. From higher up, nevertheless, the tiny white flowers give the same silvery effect as the smaller forms in temperate climes. The rough-barked tree to the right is a stunted *Podocarpus*.

feet and these holes now contained the last vestiges of water, eagerly frequented by game. On the bushy parts one of the smallest of antelopes, the white spotted dik-dik (*Rhynchotragus nasoguttatus*) was especially common as far south as Lake Baringo. Apparently here it forms the favorite prey of the fastest of the carnivores, the guopard (*Acinonyx jubatus velox*).

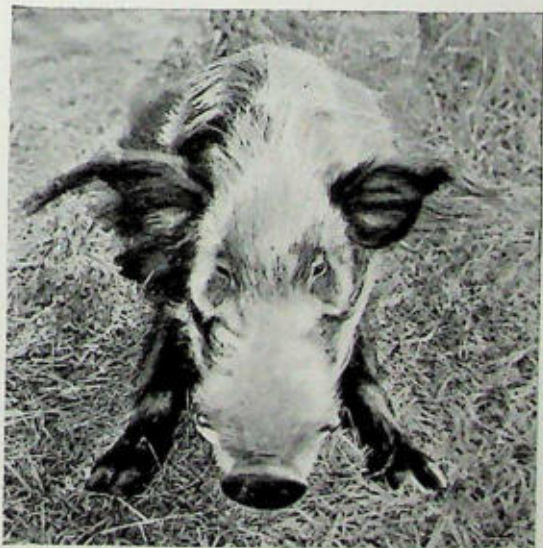
Another peculiarity of the country are the remarkably huge and numerous ant-hills, whose spires or hollow "chimneys" attain a height of as much as twenty feet. The indefatigable builders of these structures, the "white ants" or termites, force one to move camp frequently as they are liable to destroy much of the camp outfit if it is left on the same spot for any number of days. The extreme solidity and

height of these hills makes them useful points of vantage for hunters as well as for game. Many of them have about their base numerous holes that offer to other creatures a safe subterranean retreat. Often we saw the smaller lizards and also once a large monitor take refuge in them at our approach. In one of these ant-hills near the Kerio River the holes also proved to be the homes of a new mongoose (*Helogale percivali tenebrosa*⁶), a band of which was playing outside in the sun.

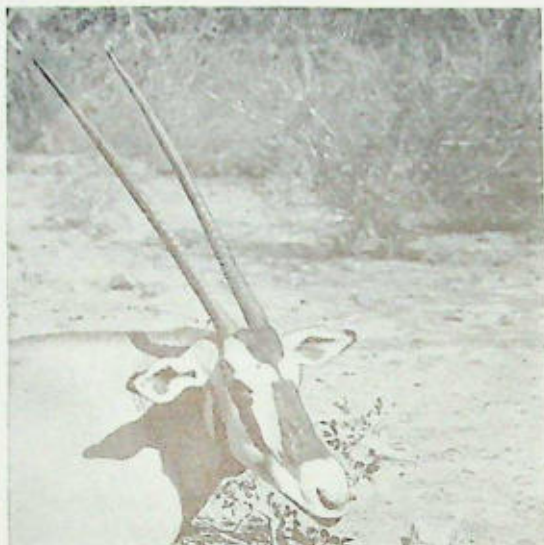
By June we had lost so many of our pack donkeys through infection from tsetse flies (*Glossina pallidipes*) that the supply of food carried had to be drastically cut down. This forced us to return to the railroad more speedily. Crossing the Kerio again we marched about one hundred miles almost due south to Lake Baringo. Water was now so scarce that only with difficulty could camping sites be found from day to day. Besides, our route passed through many sections where chaotic fields of rocks and even a large mass of hexagonal column-shaped basalt gave proof of past volcanic action, and our porters had a hard time.

Once, toward evening, as we were looking for a camping place, an elephant made straight for

⁶ Lönnberg, Rev. Zool. Africaine, V, 1918, p. 175.



The bush pig is widely distributed across equatorial Africa, but being nocturnal in habits is seldom seen by the average traveler. In the eastern portion of the continent the author visited, it is rather grayish in color and is only met singly or at the most but a few together. In the West African Rain Forest, however, its cousin, the red river hog, which gathers in large troops, is highly colored, being shorter haired, bright red with white and black markings, and is generally considered the most beautiful of pigs.



In the drier thornbush regions of the Kerio country oryx loiter about in small herds of a dozen or so and in general do not mingle with herds of other antelopes. Solitary bulls, as in many other forms, often wander about alone. Only when cornered at close quarters do the oryx use their dangerously sharp horns in defense, but they bring them effectively into play to settle fights among themselves.

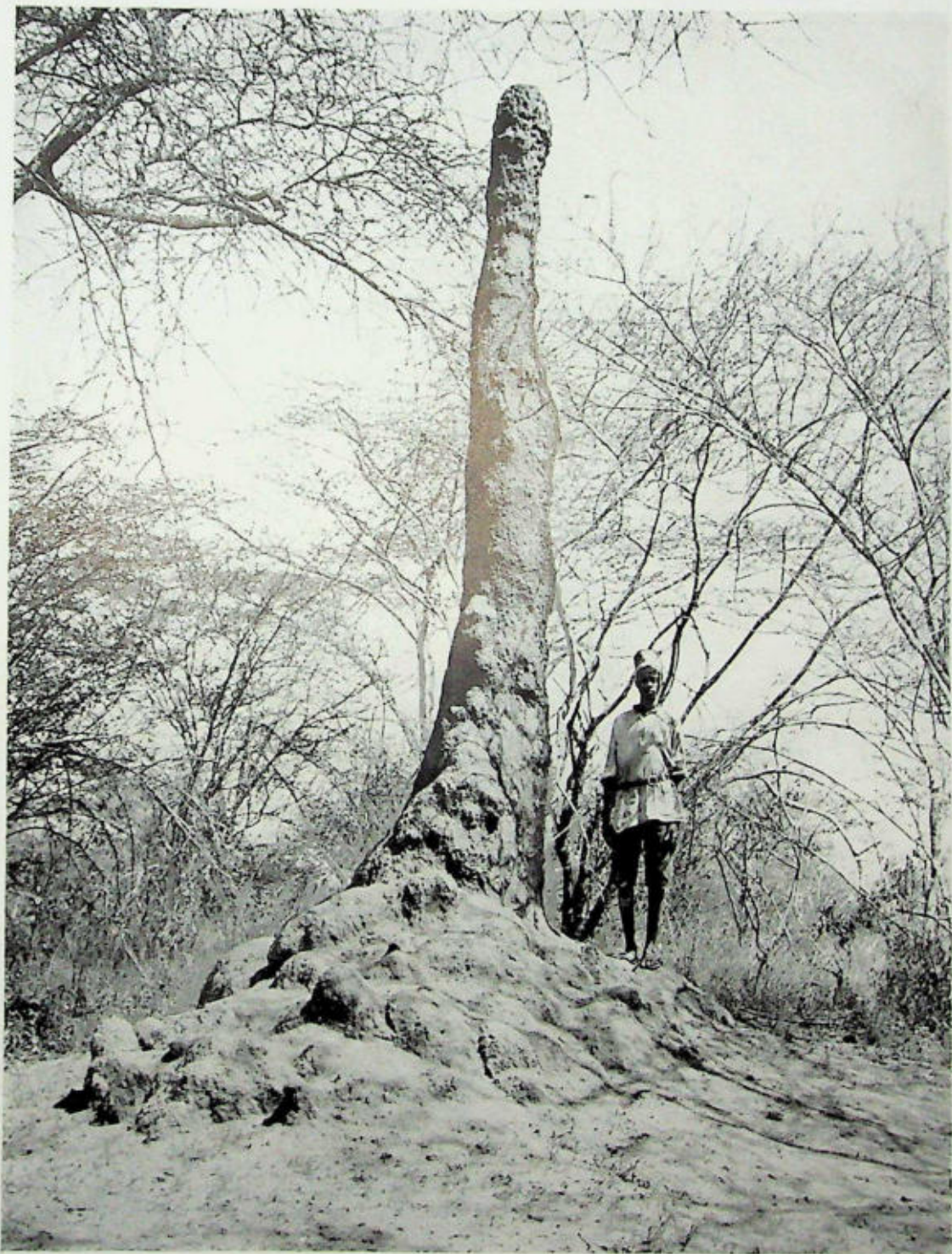
the throng of our frightened porters. About thirty yards away, he suddenly stopped short. Apparently his interest in us lagged, for, turning abruptly, he disappeared at a rapid gait. Some days afterward, south of Lake Baringo, an unlucky porter, his head and shoulders bent down under a load of waterbuck, actually walked right into a rhinoceros. As panic-stricken as the native, the confused beast charged, hurling him high in the air and inflicting a wound in his thigh in addition to a number of contusions. The porter's happiness at having escaped with his life seemed to aid his speedy recovery, for he was able to walk again within a few days.

Lake Baringo is situated in a deep depression, mountains rising on either side to nearly 9,000 feet. Clustered almost in its center is a picturesque group of five islands. The hazy expanse of water is a sight most travelers willingly forego, due to the steaming hot and reputedly unhealthy portions of that part of the country. Romance has ever attached to Lake Hannington, named after the martyred Bishop, but famous also on account of its immense flamingo rookery. At the end of June the young birds are not yet able to fly and the adults

are sufficiently tame to be photographed without a "blind." The din of their honking notes and the swishing of thousands of wings as the whole colony rises into the air is a never-to-be-forgotten performance. It is then that the bright flame-colored patch upon the wings and the strange outline of the whitish body and black pinions form a picture of bewitching loveliness against the hazy blue sky. From the shores lead up the deep pathways of nocturnal, roaring hippopotami. Formerly abundant in the stagnant water of the lake, these "river-horses" are now as scarce as the crocodiles.



On the outskirts of Mt. Elgon's bamboo brakes at 7000 feet. The density of this maze of stalks increases considerably the higher one proceeds, but as the largest stalks never grow more than about four inches in diameter they can not compare with their Asiatic relatives. Interesting however is their distribution on the few African mountains, where only at certain altitudes do they reach their maximum growth. At the proper seasons elephants frequent these brakes to feed on the asparagus-like shoots.



The tall "spires" of ant-hills erected by termites or "white ants" above the strong dome add much to the typical features of the landscape. These "chimneys" may attain a height of twenty feet above the ground. They are hollow and probably help regulate the amount of moisture in the ant-galleries that lead many feet below the surface of the earth. The many openings at the base often give shelter to a variety of smaller mammals.



A NEW DUIKER ANTELOPE

Our newly discovered duiker (*Sylvicapra grimmia lobeliarum*) lives high up on Mt. Elgon in the zone above 10,000 feet, where *Lobelia*, *Senecio*, *Alchemilla*, and other plants often unite in forming dense clusters of vegetation among which the duikers love to hide.



THE WHITE-SPOTTED DIK-DIK

The curiously elongate, easily movable, hairy muzzle is a distinctive feature of these tiny antelopes, which stand less than ten inches high at the shoulder. When disturbed during the day dart from bush to bush like rabbits. This particular form, the white-spotted dik-dik, takes its name from the marks on the muzzle.



THIS BEAUTIFUL LAKE IS FAMOUS FOR ITS FLAMINGO ROOKERY

Romantic Lake Hannington, veiled over with its bluish haze, is strongly saline, and this probably accounts for its attracting large colonies of breeding flamingos. The scarlet patch on the black pinioned wing adds much to the beautiful color scheme as thousands of these honking birds rise into the air like a solid cloud of pink.



ONE OF MOUNT ELGON'S NUMEROUS CASCADES

Innumerable large and small cascades gushing from the top of sheer precipices have contributed much to the formation of caves on Mt. Elgon. The moisture encourages a relatively luxuriant vegetation which hangs over the cliffs like a heavy drapery.

Just south of the lake a number of ostriches amused us by running for a distance parallel with our caravan. At Maji Moto we could not forego the pleasure of resting in a luxuriant gorge where flows a source of clear, hot water, also a reminder of the former volcanic condition of these regions.

How sorry we were to see our trip nearing an end, marked by our approach to Nakuru. The landscape changed noticeably as we en-

tered the grassy plains along the Molo River. Many farms have been established there in recent years. Thus almost under the equator, and on the very edge of the more arid and desert stretches a new civilization is being built up. May its members in this wilderness use their undaunted courage to help preserve intact for generations to come the glorious wild animal life of at least the region outside of what has proved to be the white man's country!

THREATENED QUICK EXTINCTION OF THE WHITE RHINOCEROSES

By W. T. HORNADAY

UP to yesterday, American zoologists generally, and also many elsewhere, had been resting optimistically in the belief that in North Central Africa, the great white rhinoceros is in no danger of extinction, either in the present, or in the near future. And more than this, we have believed, just as our South African colleagues have believed, that even the very small remnant herd in Zuzuland was so well protected that its end was not in sight. Naturally, we were greatly shocked and amazed by the recently published statement of Henry A. Snow that he had slaughtered *four* members of that remnant herd of 26 animals, for a "habitat group" for the small Oakland (Calif.) Museum. It transpires that Snow actually received a "permit" for the killing of three of those animals, and the logical conclusion is that the fourth was killed contrary to law.

The issue of that permit to Snow was a horrible blunder on the part of the Natal government, the like of which never should be repeated. "Permit" or no permit, it is now a crime against a vanishing species of great value to kill even one of those Southern white rhinoceroses, no matter what the purpose or excuse may be. There is a point at which even "scientific purposes" must stop; but H. A. Snow, the game-butcher, seems never to have realized it. It is a great pity that he can not be adequately punished for his crime.

We are now in receipt, from two sources, of most alarming news regarding both the northern and southern white rhinoceroses. The former were brought into world-wide notice through the collecting work of Col. Theodore and Kermit Roosevelt. Finding white rhinos really plentiful in the Lado District, on the west bank of the Nile between Khartoum and Gondokoro, they took seven specimens, and bestowed all of them in four American museums. Westward of the Lado Country, Messrs. Lang and Chapin eight years ago found plenty of white rhinos in the Belgian Congo territory, and collected specimens for the American Museum, in New York. Mr. Lang's excellent and illuminating article on that species in the *Zoological Society BULLETIN* of July, 1920, contained a map of distribution that was quite reassuring. In fact, we were led to feel that at

least the northern species was fairly secure against extermination. In 1920, Mr. Lang estimated that there might be between 2000 and 3000 northern white rhinos alive.

But the lapse of half a dozen years has changed all that. The abundance of modern high-power and long range repeating rifles in the hands of natives is now a curse to all the big game of the whole world, and now nothing killable is secure. I have now to present two pieces of evidence of a most alarming nature:

THE WHITE RHINOCEROS

To the *Journal of the Society for the Preservation of the Fauna of the British Empire*, just off the press, Dr. Cuthbert Christy contributes an article on this species from which we must reproduce the following paragraphs:

"The case of the white rhino, as most people seem to realize, is a pretty hopeless one. He obviously belongs to another world, and his extinction in this is fairly certain in the near future. In the British Sudan, very few individuals remain. Those along the west bank of the Nile can, I should fancy, not exceed half-a-dozen pairs.

"In 1916, on the Congo side of the divide, especially in the district opposite the Meridi-Yambio section, I found the species individually was much more common than anywhere on the British side. On the morning of my arrival at Aba on the motor road, early in that year, the natives had speared two rhinos within sight of the station. The animals were both young males, and in the neighborhood I saw quite a number of rhino skulls bleaching in the sun, conspicuous objects in the recently burnt-off bush. In a Greek store at Aba, on the same occasion, I was shown a pile of at least a hundred rhino horns, worth from £1 to £3 apiece, I think the trader told me, but which he could not sell owing to the restrictions put upon their sale in, or transit through, the Sudan.

"Compared with the common rhino this species, in my experience, might almost be described as harmless, and nothing could be easier for the native, I should think, than to spear him; hence, I fear that his extinction is within sight. The only question now is, How can his existence best be prolonged? In the

British Sudan he can be and should be protected, and if his name has been allowed to again appear upon the 'Game List,' I hope every endeavor will be made to induce the Sudan Government to reverse their decision, and place it again upon the 'protected list.' Success in this direction, however, is not sufficient to have much real effect in prolonging the life of the species. It is with the Congo authorities in Brussels that action should be taken. The small region in the Congo in which the animal is commonest is almost uninhabited, and it would not be difficult for the Congo administration to enforce upon Chief Bwendi, and one or two other small chiefs of the region, a prohibition in favor of this interesting species, forbidding at the same time the sale of rhino horns throughout the Congo. The authorities of the Nbangi Shari district of French Equatorial Africa should also be asked to participate, in order to make the Congo prohibition effective."

THE SOUTHERN WHITE RHINOCEROS

This extract from a letter received on October 12th from Major J. Stevenson Hamilton, Warden of Government Game Reserves, Province of Transvaal, tells what possibly may be Part I of the last chapter of the Southern species.

"Your mention of white rhino brings me to what I have been intending to write you about for some weeks.

"We are now faced with the imminent destruction of the very last of this splendid species. I hear on the very best authority that in spite of official statements, there are today certainly not more than sixteen, and probably not more than twelve of them left in the Reserve set aside for them. Moreover, recognizing that so long as these white rhinos are in existence the Administration will refuse to throw the area open for settlement, the neighboring farmers have decided, deliberately, to completely exterminate the animals, since they all cover the land. To this end they watch their opportunity, and from time to time one or the other enters the reserve stealthily, and shoots any of the animals he can see, leaving the carcass to lie where it falls. A few months ago a young man was convicted of having shot *two* and was fined the ridiculous sum of £25, remarking that he had deliberately killed them, and that he and his friends intended to 'finish the lot.' There is not the smallest doubt that unless we get to work at once, and effect some-

thing in the coming year, by the next one the species will be extinct for ever.

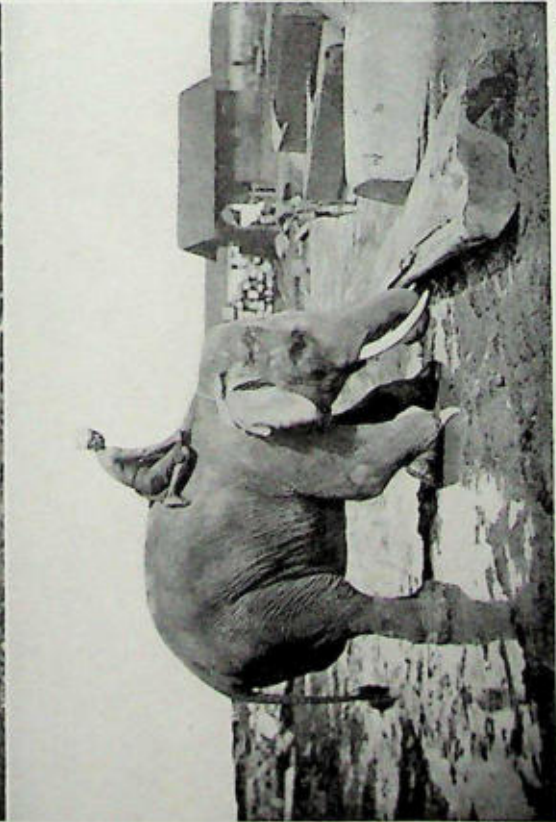
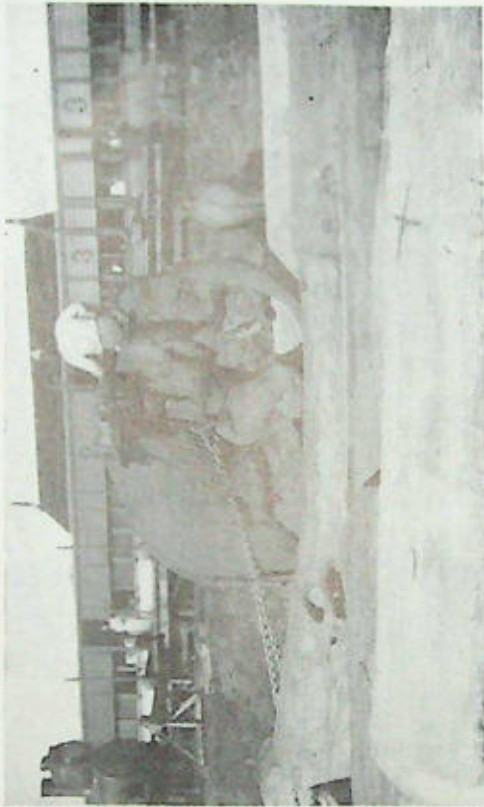
"Last week we had a meeting, Dr. Haagner, Col. Reitz, (Minister of Lands) and others, and decided that a committee should be formed and funds raised in the hope of being able to catch as many as possible of the animals and transfer them to this Sanctuary, where they will be safe. Such a project, however, will cost anything up to £10,000, and is far beyond anything the government here can do, nor, I much fear, is public interest sufficiently keen on preservation to allow us to hope for anything material, especially in view of the present impoverished condition of the country.

"Great Britain is, I fear, also financially so embarrassed, and the people who in old days would have helped are now so poor, that we shall get little there but sympathy. America is our only hope. Do you think a call for a subscription for the purpose would meet with any response from the American public? I think even had we only £5,000 something useful might be done; but you see the capturing involves the employment of probably several thousand natives for several weeks, the building of a huge keddah and a driving 'funnel' more than 20 miles long, besides costly special vehicles, expensively paid experts, and many other items. Wages alone would run into thousands.

"But the position is really desperate. Lulled to rest by the assurance of the Natal Administration that there were 30 to 50 of the animals yet remaining, and that their reserve was not to be tampered with any more, I recently wrote you, I believe, that all was well. I only received this rude shock a few weeks ago, when Col. Reitz, who is keenly interested in Game Preservation, discovered the awful truth on his recently official tour through the locality."

After a careful survey of the situation (in South Africa) the following are my conclusions:

1. The remnant of from 12 to 16 southern white rhinoceroses are so scientifically valuable that they justify a great effort for their preservation.
2. It would be financially and otherwise impossible to carry out the great scheme of capture and transfer that Major Hamilton suggests. Even if money were available, it is highly probable that many of the animals would die during the operation.
3. The animals might possibly be saved by throwing around them a cordon of picked na-



"ELEPHANTS A-PIPING TEAK"

One foundation for the claim that elephants are the most intelligent of living animals is that they can be caught full-grown and successfully taught a life of service to man. They master the manipulation of cut logs of teak, levering and carrying them in the easiest ways and conserving time and strength with what appears reasonable mentality. Both sexes are employed and when young elephant calves are about, the working old ones take the utmost care not to injure them with the great logs they are piling.

Photos from Rangun by Beebe & Klier

tive game wardens, and the imposition of punitive fines and imprisonment that would make any farmer or other rhinoceros murderer afraid to look cross at any of these animals.

4. A special fund of \$5,000 should at once be raised in America, to organize a protective effort of the kind suggested and put it on its feet for two years. If done, this would give the government of the Union of South Africa time to organize permanent protective measures. It would be nothing less than a burning shame for those murderous farmer miscreants to be permitted to exterminate those grand and wonderful animals, that nature has been perhaps 10,000 years in developing, without at least one more effort for their preservation. To this end the Permanent Wild Life Protection Fund will subscribe \$1,000, and it now invites other subscriptions to make up the remaining \$4,000.

A Rare Pigeon.—No matter how many rare and beautiful species any collection of living birds may contain, there are always a few that excel in attraction to the general public. They form focal points of interest and their disappearance from the exhibition cages invariably incites so many inquiries that we are stimulated to make every effort to replace them. One of the most important of these birds is the bleeding-heart pigeon, a species which has seldom been absent from our collection. Its most conspicuous character is the wonderfully simulated blood-patch which it wears on its breast. The centre of this apparently fatal wound is formed by a dark red clot, the effect being perfected by lengthened and stiffened feathers. This patch is surrounded by blood-stains, which gradually fade to the pure white of the remaining portions of the breast. So perfect is this mimicry that kind-hearted visitors are constantly coming to us with the information that one of our birds has been badly injured and is in great danger of death from loss of blood.

That a bird so strikingly decorated could fail to take a prominent position in the folk-lore of its native land is quite impossible. As a matter of fact, there are many stories connected with it, one of the most interesting of which is given by Miss Rosie Alderson in "*My Foreign Doves and Pigeons.*" Miss Alderson states that when the Philippines were visited by Christians in the 16th century, it was found that while the natives had no knowledge of Christianity, they never-

theless had the following legend: a cross having been erected, a dove settled on it and was shot by a soldier. The bird had a white breast but after this occurrence, the cruel wound was carried by the species ever after. Miss Alderson explains the existence of this legend by the supposition that Christianity had been preached long before by a ship-wrecked Friar, only this and similar tales surviving in the minds of the people.

The bleeding-heart pigeon is a hardy and long-lived bird in captivity. It has usually been fairly easy to obtain and when, in 1921, the last survivor of an aged flock was killed by accident, we had no doubt as to our ability to replace it promptly. Casual inquiry amongst the dealers, however, soon brought disillusion. No bleeding-hearts were to be had, nor were there likely to be any, since a new insular law, of which we had not heard, rigidly forbade their exportation from the Philippines.

When Ellis S. Joseph arrived, in 1922, with one of his usual caravans, his services were asked and readily given. Armed with an appeal to the Governor, Mr. Joseph swore to secure the birds. On his return to Australia, he obtained the necessary permission, and cabled a Hong Kong agent to get the birds from Luzon and forward them to Sydney. In course of time, this was safely accomplished, and on September 1, 1923, we were again able to exhibit the bleeding-heart pigeon. L. S. C.

Wood Duck Hunting Prohibited.—Wood ducks may not be hunted in Minnesota or in any other State at any season, according to the Biological Survey, United States Department of Agriculture, which administers the Migratory-bird Treaty Act. This is a Federal law under which the hunting, killing, or possessing of wood ducks is prohibited at all times throughout the United States and by treaty throughout Canada also. This game law, having been upheld by the United States Supreme Court, makes inoperative the amendment to the game laws of Minnesota passed at the last session of the State Legislature, providing an open season on wood ducks. Thus hunters will not be allowed to exercise the privilege accorded them by the State law, and persons found hunting, killing, or possessing wood ducks at any time will be subject to prosecution in the Federal courts.

tive game wardens, and the imposition of punitive fines and imprisonment that would make any farmer or other rhinoceros murderer afraid to look cross at any of these animals.

4. A special fund of \$5,000 should at once be raised in America, to organize a protective effort of the kind suggested and put it on its feet for two years. If done, this would give the government of the Union of South Africa time to organize permanent protective measures. It would be nothing less than a burning shame for those murderous farmer miscreants to be permitted to exterminate those grand and wonderful animals, that nature has been perhaps 10,000 years in developing, without at least one more effort for their preservation. To this end the Permanent Wild Life Protection Fund will subscribe \$1,000, and it now invites other subscriptions to make up the remaining \$4,000.

A Rare Pigeon.—No matter how many rare and beautiful species any collection of living birds may contain, there are always a few that excel in attraction to the general public. They form focal points of interest and their disappearance from the exhibition cages invariably incites so many inquiries that we are stimulated to make every effort to replace them. One of the most important of these birds is the bleeding-heart pigeon, a species which has seldom been absent from our collection. Its most conspicuous character is the wonderfully simulated blood-patch which it wears on its breast. The centre of this apparently fatal wound is formed by a dark red clot, the effect being perfected by lengthened and stiffened feathers. This patch is surrounded by blood-stains, which gradually fade to the pure white of the remaining portions of the breast. So perfect is this mimicry that kind-hearted visitors are constantly coming to us with the information that one of our birds has been badly injured and is in great danger of death from loss of blood.

That a bird so strikingly decorated could fail to take a prominent position in the folk-lore of its native land is quite impossible. As a matter of fact, there are many stories connected with it, one of the most interesting of which is given by Miss Rosie Alderson in "*My Foreign Doves and Pigeons.*" Miss Alderson states that when the Philippines were visited by Christians in the 16th century, it was found that while the natives had no knowledge of Christianity, they never-

theless had the following legend: a cross having been erected, a dove settled on it and was shot by a soldier. The bird had a white breast but after this occurrence, the cruel wound was carried by the species ever after. Miss Alderson explains the existence of this legend by the supposition that Christianity had been preached long before by a ship-wrecked Friar, only this and similar tales surviving in the minds of the people.

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New York Zoological Society



OBJECTS OF THE SOCIETY

☞ A PUBLIC ZOOLOGICAL PARK. ☞ A PUBLIC AQUARIUM. ☞ THE PRESERVATION OF OUR NATIVE ANIMALS. ☞ THE PROMOTION OF ZOOLOGY.

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WILLIAM BEERE,

Director of Tropical Research and Honorary Curator, Birds

Each author is responsible for the scientific accuracy and the proof reading of his contribution.

VOL. XXVII JANUARY, 1924 No. 1

BIG GAME ON NATIONAL FORESTS

Estimate by the

U. S. DEPT. OF AGRICULTURE

NEARLY 441,000 head of deer make their home on the national forests according to a rough estimate of big game animals recently completed by forestry officials of the United States Department of Agriculture. The largest herds of deer are found on the national forests in California, which shelter approximately 185,000 head.

Oregon is next to California, with a total of 57,000, its largest herd being on the Santiam National Forest. Montana ranks third, with a total of 41,000 head, the largest single herd of which grazes on the Jefferson National Forest. Idaho is fourth, with a total of nearly 39,000.

Sixth on the list is Arizona with about 34,000 head of deer, 20,000 of which graze on the Kaibab National Forest alone. This forest contains the Grand Canyon National Game Preserve, where hunting is not allowed. The herd on the Kaibab Forest has often been erroneously

described as the "largest herd of deer in the world." As a matter of fact the Kaibab herd is greatly exceeded by the herds on the Trinity and California National Forests in California.

The number of elk grazing on the national forests is placed at 40,500, according to the big game estimate. The Teton National Forest in Wyoming, bordering the Yellowstone National Park on the south, contains a larger number of elk than any other national forest, although several other, notably the Olympic Forest in Washington, have herds ranging from 3,000 to 7,000 head.

On all national forests hunting is allowed in the open season except on areas established as Federal or State game refuges.

ELK HERDS INCREASE

During the last three years the winter losses of elk in the national forests surrounding the Yellowstone Park have been negligible. The increase in the herds has been high, and two or three years more of mild winters and good summers may bring another danger point with a die-off in a hard winter such as was experienced in 1919-20.

Forest Service officials point out that a permanent increase in the elk of the Northwest, especially around the Yellowstone, is largely a matter of available winter range, which is extremely limited, the greater portion of the old winter ranges having been taken up by settlers for homesteads.

The recent big game census also shows increases during the past few years in several plants of elk made on various national forests. The plant made about ten years ago on the Sitgreaves Forest in Arizona, consisting of about 65 head, now numbers over 350 head, and it is possible that the State Game Warden may permit hunting of elk in the near future in order to check too rapid growth.

Pronghorned Antelope are still in a very unsatisfactory situation, forestry officials say. The census shows a few antelope in many national forests, but nowhere are they increasing. In northwestern Nevada and southeastern Oregon there is a large antelope herd, estimated at from 1,500 to 3,000 head, grazing on public lands outside of forest areas. An effort is now being made to secure the creation of a game refuge which will cover the habitat of this herd so that it may be protected and saved from extermination.

The number of moose on the national forests has been increasing in recent years. The largest

number is found on the Teton National Forest in northern Wyoming where moose are now becoming rather plentiful.

In addition to deer, elk, and antelope, the estimate lists 149 buffaloes on National forests, 67 caribou, 10,500 mountain goats, and 12,300 mountain sheep.

The buffaloes are mainly on the Wichita National Forest and Game Preserve in Oklahoma. Forty buffaloes, representing the increase of this herd beyond the carrying capacity of its range, have been given to city parks and zoological gardens during the last four years. One buffalo was presented to the Republic of Mexico and one to Montevideo, Capital of Uruguay.

The estimate as a whole indicates that except for the antelope there has been a slight increase in the number of most big game animals on the national forests. The census was conservative, and an underestimate is regarded as more likely than an overestimate.

A Grizzly in Washington.—One of the few grizzly bears ever killed in the State of Washington was shot late this summer by Government Hunter P. C. Peterson after he had trailed the animal with his dogs for several days in the Okanogan National Forest.

The dogs followed this last grizzly from 7 o'clock in the morning until 2 in the afternoon, when they caught up with him in a clump of bushes on Holman Creek. When the hunter approached, the bear charged, but the dogs drew him off permitting the shots which killed him.

The bear weighed about 1,000 pounds, and stockmen said he killed livestock not only for food but for recreation. It was reported that during the summer this ranch raider had killed 35 head of cattle and 150 sheep and had done damage estimated at \$3,000.

Protection for Chimpanzees.—Chicago, Dec. 31.—The Governor General of French West Africa has issued an order forbidding the capture, sale or exportation of living chimpanzees in French territory, according to the Paris representative of the American Medical Association. Special permits to capture and export chimpanzees for scientific purposes may be secured by scientists and medical investigators. The permits are limited to time and the number of chimpanzees that may be captured. Animals may be captured only with nets or traps, and not wounded.—N. Y. *Evening Post*.

Cock-of-the-Rock.—Colloquial bird names are seldom accurate as far as relationships go,

but often they are singularly apt in application. The cock-of-the-rock in no cock in the gallinaceous sense but the large "comb" of feathers and the fowl-like beak make the resemblance amusingly close. The bird is really a member of the passerine or perching-bird group, not even remotely related to the Galliformes.

Because of its brilliant orange plumage and its great rarity in collections, the cock-of-the-rock is keenly sought and highly prized when once obtained. Four species are known but the only one that has ever been exhibited alive is *Rupicola rupicola*, from northern Brazil, British Guiana and Venezuela. It is found only in almost inaccessible mountainous regions, so that its capture and transportation are very difficult matters.

Four cocks-of-the-rock have reached us, through the efforts of the Tropical Research Station, the first time in June, 1916. The last, received on August 13, 1920, lived until September 16, 1922, the period of over twenty-five months establishing what we believe to be a longevity record for the species.

While engaged in mine inspection in Venezuela, during the early summer of 1923, Mr. E. Percy Smith, a mining engineer of New York, received as a gift, two cocks-of-the-rock, caught for the purpose by Indian hunters. Though both were fully adult, they readily accepted the new conditions and were brought safely to New York. Unfortunately, however, one of the birds died soon after arrival and Mr. Smith, fearing that a similar fate might overtake the survivor, decided to present the bird to the Zoological Society. It was brought to the Park on August 28th and now occupies the particular aviary which, for several years, we have been happy to designate as the "cock-of-the-rock's cage." L. S. C.

Shoes of Python Skin.—New footwear includes some unusual varieties. In addition to crocodile and lizard dealers have shoes made of rare python and shark skin. They have secured a very fine python and are making up the skin, which is an attractive and fashionable fawn color. The shark skin shoes are in a good shade of brown, those of crocodile skin in a warm chocolate shade approaching henna and lizard shoes are mostly gray and white, the markings varying a little.—From the *London Times*.

Wanted: The following numbers of Zoological Society Bulletin: November, 1916; March, 1917; May, 1917.



GIANT LAND IGUANA FROM GALAPAGOS.

Conolophus subcristatus (Gray)

These brightly colored lizards feed on blossoms and spiny cactus; they are very vicious, but not difficult to run down and capture. Many specimens are living in the Zoological Park.

A Water Color drawing by Isabel Cooper from a new book—by William Beebe—Galapagos; World's End. Published by Putnam, N. Y. City.



DEPARTMENT OF
TROPICAL RESEARCH
OF THE
ZOOLOGICAL SOCIETY

Contribution Numbers 163-164



FIVE HOURS IN THE GALAPAGOS

By WILLIAM BEEBE

Photographs by the Author and John Tee-Van

IN the Zoological Society's Collections at the present time is a Flightless Cormorant, *Nannopterum harrisi* (Rothsch.), which I brought back on the Harrison Williams Expedition from the Galapagos. It has been in captivity now for more than a year, and is in perfect health, eating heartily after molting successfully. In fact it is so aggressive and can do such execution with its strong, hooked beak that the keepers have to guard against sudden attack on the part of the big bird.

I caught two of these birds on their nests in Tagus Cove, on the west side of Albemarle, on April 6th, 1923. At the Aquarium in Battery Park is a Galapagos Penguin, *Spheniscus mendiculus* Sunde., which was captured on the opposite side of Tagus Cove on the same day.

These birds are sufficiently rare, and their haunts and the incidents of their capture unusual enough to be worthy of narration in the Zoological Society's BULLETIN. I have taken the following account almost unchanged from a chapter in my forthcoming book, "Galapagos; World's End," which will be published under the auspices of the Zoological Society.

We left James Island early on April 5th in search of much needed fresh water, and skirted the north and north-west shores of Albemarle, crossing the equator twice in four hours.

Albemarle is as rugged and barren as any of the Galapagos; everywhere over the sides of the great volcanos the sparsely green slopes were streaked with patches and furrows of lava, spreading out here to fill a hollow and narrowing to a line there as the molten stuff found a channel in which to flow. Wonderful cloud effects formed round the crater tops, the highest of which reaches a five thousand foot elevation, and knowing that there were vents from which steam and gas were constantly issuing, we

strained our eyes in the attempt to make out smoke clouds over the misty mountains. Innumerable small craters pitted the flanks of the large ones, and even close to the water's edge there were little truncated cones that once upon a time had heaved themselves up and spit fire in imitation of their betters.

Tagus Cove looked so little like its portrait on the chart that we refused to recognize it and overshot it several miles, steaming farther south in an endeavor to find something we liked better. We saw nothing but surf-drenched lava shores with no sign of shelter, so somewhat shamefacedly we returned. As we steamed slowly inshore, Tagus opened out before us into a perfect anchorage—a long, narrow cove, with sheer black walls coming almost straight down to the sea all around, and with deep water to the very foot of the cliffs. Opposite the entrance rose the ravaged sides of Narborough Island; dark and grim at the head of the cove was a ravine which cleft the surrounding heights and offered the only possible landing place, though even here the surf broke heavily on an abrupt face of rock. A few shearwaters and one pelican were the only signs of life except the alien Noma creeping cautiously inshore. Against a wonderful sunset of purple and green the sombre land loomed dark. After the rattle of the anchor chains had ceased to echo from the cliffs, an eerie stillness settled down, and we felt that we might indeed be the "first, who ever burst, into that silent sea." Quotations from The Ancient Mariner seemed constantly to occur to us among these islands. Perhaps the presence of the albatross, seen on the first day, influenced us; certainly "water, water, everywhere, nor any drop to drink" was so appropriate as to be positively painful.

With the help of a scaling ladder we man-

aged to land on a flat rock at the mouth of the ravine and had a half hour of daylight before the sun sank. This meant only a short walk, and an unsuccessful search for a fresh-water pond. In a shallow cave near the shore, many old dates were carved, one of 1836. An anthill in volcanic dust yielded six ants. The most conspicuous things were white, long-petalled flowers, two to each plant, with half a dozen elongated leaves growing in the dust. Their roots penetrated a bare half inch.

As we landed, pelicans were fishing in the dusk, but the greatest thrill came when we saw our first flightless cormorant swimming fearlessly near the boat. It watched us and now and then dived deeply, once passing far down under our bows. Just before dark as we were rowing back to the yacht, a bird swam ahead of us, which looked very much like a shearwater, although one of us thought it was a penguin. This decided us to remain at least long enough on the morrow to learn more of these remarkable birds.

We returned after dark in an unenthusiastic frame of mind as far as fresh water was concerned. The chart said there was fresh water at Tagus Cove but by this time our attitude toward the chart statements was like that of most people toward the weather bureau's prophecies. There was nothing left to do but to go to Chatham Island, the only inhabited one of the Galapagos. Here there is a small penal colony, and here we knew we could get water, for the inhabitants must live, and besides we had read of schooners that in recent years had stopped there for refreshment.

In order to reach Chatham on time, the Captain announced that we should have to leave Tagus Cove at ten o'clock the next morning. So we girded up our cameras, guns and collecting paraphernalia, and turned in early, ready for a few precious morning hours of the hardest, quickest work we could possibly achieve.

In this equatorial, twilightless world it was as dark as midnight at five o'clock when we came on deck into the cold sweet air. It was too chilly for comfort. A scant half moon hung in the zenith, but it was almost eclipsed by the brilliancy of Scorpio which was almost twisted about it. The Southern Cross lay flat on its side near the horizon, Gemini was low in the west, and Venus, the magnificent, rested like some wonderful unearthly beacon, exactly on the summit of the mountain east of Tagus.

On all sides of us were the high, mysterious

cliffs, dark and silent as they had been when they looked down upon the ships of the old buccaneers, of the whalers, of occasional ships of war of various nations, even upon Lord Byron in charge of the dead bodies of the King and Queen of the Sandwich Islands.

Not a sound of night bird, or distant bark of dog in this desolate land; only motionless heaps of cinders, piles of dust undisturbed by any breath of air and scant foliage hanging limp and quiet as the rocks themselves. Only once was the sight and sound of this oceanic isolation broken, when one of the most brilliant meteors I have ever seen shot across the sky, with a blazing glare of light and a low, sinister hiss, vanishing beyond the distant crater rim as if it had plunged within—a worthy sanctuary for this inorganic wanderer from outer space.

While waiting for breakfast we collected the half hundred moths which had flown on board during the night, and loaded the boats ready for instant disembarking. The water in our shut-in bay was smooth and black and it merged indistinguishably with the shadows of the surrounding cliffs, so that the Noma seemed to float at the bottom of a narrow well.

After hastily snatched cups of coffee, we divided into three parties, one going the rounds of the cove to see what the waters and overhanging cliffs had to offer, another went up to the head of the bay and inland along the ravine. I chose to attempt to land on the northern side farther out toward the open water, and if possible to strike upward to the colonies of birds along the edge of the cliffs. As it turned out this arrangement was as perfect as if we had known beforehand what awaited us.

With Bill Merriam and John Tee-Van I set off for the seabird cliffs near the outer mouth of the cove. Skirting the cliffs we discovered an inlet with the slope at the head less steep than on each side, but the end proved so narrow that the slight rollers surged up and down a height of about eight feet and made landing unthinkable. Near the entrance we found a half-concealed, water-worn gully, with a narrow ledge of lava just above water line. Leaping out on this we passed out cameras, guns and tackle on the upward lift of the boat. Then began a ghastly climb, up and down, up and down, over slopes just under the sliding point of loose clinkers. The surface was composed of my old friends, flat slabs of lava like man-hole covers, balanced and resting on a thick layer of volcanic dust. We never dared climb in line, for time after time, a careless step would



SKIN OF FLIGHTLESS CORMORANT

The wings of the Flightless Cormorant are smaller in proportion to its size than were those of the Great Auk.

upend one of these rocks and it would go careering down hill like a runaway cart wheel, starting sub-avalanches at every touch. With a forty pound moving picture camera in one hand, a three-barrel shot gun in the other, and a gamebag which was diabolically clever in getting in the wrong places, one's feelings were far from science when the foothold gave way. At such a moment I would sink flat and spread eagle as much as possible, chewing and eating dust which had taken part in the birth of Albatross. Slowly I would move down hill, with a movement as sickening as that of a circular earthquake. Rock after rock would hurtle to the bottom and splash into the black, sharkful water. More than once when I seemed actually to be gathering momentum, my eye caught sight of the Noma riding so peacefully at anchor, and I would have given much to be on board of her. Within a few seconds time I mused apparently for hours on the insanity which impelled me to tempt fate thus—when a fraction of a degree's greater pull of gravity would precipitate myself, camera, gun, clinkers and dust into the

depths of Tagus. Then my foot would catch in the precarious roots of some small plant, which in my present plight seemed as a mighty oak.

I even welcomed the painful assistance of a cactus, anything rather than that feeling of utter helplessness, when the whole earth seems sliding downward with you. The moment I achieved some kind of grip, my mind went ahead to the boobies and possibly cormorants awaiting me and I would slowly and painfully arise, and from a serpent's progression, attain that of a quadruped, and on hands and knees creep to the nearest point of safety, for another attack upon the slope above. My helpers could do nothing to help, nor could I offer assistance when they were in trouble. The greatest kindness was to keep as far apart as possible. In the cold chill of early morning, we were panting and soaked with perspiration when we reached the summit of the succession of knife-topped ridges back of the colonies of birds.

From now on our way led gently down hill, with no more under foot trouble than would be

offered by a ploughed field of jagged stone. Dodging the thick growth of thorn brush, we encountered a veritable chevaux-de-frise of cobwebs. Here were the same zigzag-backed spiders as elsewhere, of the largest size and with webs as thick and strong as elastic cord. With arms full of apparatus, and every pore dripping, lame and sore from our frightful climb, it was no added pleasure to have hundreds of sticky weblines across eyes and ears and face, with the spiders themselves crawling everywhere from cap to knees. I sometimes stopped, seized a single great strand, lifted it and snapped it back of my head without even nearly breaking it.

A few of the giant, brilliantly colored grasshoppers flew up before us and were now and then entangled, but everywhere were scores of close-wrapped remains of big sphinx moths which had been caught during the preceding night. In the early morning dawn songs arose in all directions from the throats of little black finches. The mockingbirds which came to look at us, were silent for the most part, many of them accompanied by full-grown young.

I will never forget the scene when once we could drop our loads, stand erect and let our pounding pulses gradually quiet down. Landward, one's eye followed the low slope, leaping the dozen gorges up and down which we had toiled, and watched it slowly steepen until it culminated high against the sky on the crater rim of Tagus mountain, eight hundred feet above us. It was covered with lava and volcanic ash, with meadows between of the equally terrible bur-grass sheltering the myriads of hooked seeds. Here and there were groups of small trees, with the scanty foliage greyed with dust and yellowed with the beginning of the pitiless drought which was closing down for the coming eight months. To the west lay Narborough, with its symmetrical slopes standing out like bronzed steel in the dawn light.

Northward, the two great volcanic peaks which we had encircled yesterday, showed clearly, the daily cloak of clouds having not yet formed. Immediately behind was the marvellous evensided cove, with its steep slopes sliding sheer into the water. Beneath, on the rim of the cliff, giant breakers dashed foam over and around rugged piles of lava, while one, mighty, flat-topped cube was completely covered with huge iguanas, all sprawled out in the sun.

We finally reached the rookeries, which we found to be a pure culture of blue-footed boobies. To our intense disappointment we saw no trace

of cormorants from water-level to cliff top. The nests of the boobies were on the very edge of the cliff and when I first approached, several dozen were gathered together, many full-sized brown birds with quivering wings importuning their parents for food. When I was a few yards away they dropped off the cliff and floated gently outward, some of them, banking up wind, turning and drifting back. When a few feet from my face they put on brakes and hung in mid-air, craning and twisting their necks to get a good view of me with their great yellow eyes. The remaining birds were all sitting on eggs and refused to leave. When we wanted photographs and moving pictures of their eggs I had to push the birds back. Even the males, easily distinguishable by the small size of the pupil, were quite fearless, and faced me unflinchingly as I walked up to them. Solan goose is a good name for them, for in the general clamor of a rookery, the dominant sound was the strident goose-like trumpeting of the females. The egg or eggs were laid simply in a hollow in the ground worn by the bird's body, or in a crevice of the lava. I took five sets of eggs, three of one, and two of two eggs each, and this was about the general proportion.

After taking hundreds of feet of film, and dozens of plate photographs, we picked up several birds and wrapped them in game bags, preparatory to carrying them back to the Noma, and at this moment a boat with the members of party number two appeared at the foot of the cliff and yelled up something about penguins. We had not expected to find penguins here, in spite of our vision of the night before, and this thrilling news made us pack up in all haste and return. None of us will ever forget the trip back. Bill Merriam had the great moving picture tripod and the bag of live boobies, and if the accidents and unexpected and impossible things which happened to him on the back trail, could have been filmed, it would have eclipsed the utmost of Hollywood's effects. The three legs of the tripod appeared alive and the birds were miraculous in their ability to get a wing free at critical moments. Once there were three flapping wings and I almost feared that Sindbad's experience with the roc would be repeated with Bill. How we managed to get safely down that nightmare place I cannot explain, but at last we fell into a life-boat, an inextricable mass of cameras, men, guns, tripods, boobies and bags.

We went full speed straight across the cove to a series of caves just in time to see Mr.



THE *NOMA* IN TAGUS COVE, ALBERMARLE ISLAND, APRIL 6, 1923.

On the slopes we discovered, studied and captured the Flightless Cormorants and Penguins which are now living in the Zoological Park and the Aquarium.



A STRUCTURAL VIEW OF THE CORMORANT

The Flightless Cormorant of the Galapagos, showing the small wings, the large feet and strong rudder tail.

Curtis ladle out several penguins. They were all in the dark at the back of the cave and obligingly came out one by one and stood still until the net closed over them. When taken out in the boat they made no attempt to bite or escape, accepting their new environment and friends with perfect equanimity. I examined the cave and from the number of feathers and abundance of sign, I am certain these birds were bred there. We captured two full-grown birds of the year and an adult female.

These are the smallest penguins in the world, and of course the most northern of their kind, all other being wholly Antarctic. On our return trip, far north of Tagus, but still on the west coast of Albermarle and about six miles north of the equator, I was watching the shore with powerful glasses resting on the rail when I distinctly saw four penguins waddling over the rocks. They jumped in, feet first, as they usually do, came up and swam around as long as we were in sight. This is the first time these birds had been seen north of the equator and while not a relatively important new fact, yet it is interesting as

extending the distribution of the order Sphenisciformes into the northern hemisphere.

We had hardly recovered from the excitement of capturing the penguins when word came from another exploring party that there were cormorants on their nests just across the cove. Sending to the Noma for more films and plates, we went across and found two magnificent flightless cormorants sitting on their nests. The two nests were fifteen feet apart on slight projections of lava rock on the steep slope, and about twenty feet above the water. Each bird had a single egg and nothing would induce them to desert it. Even when one of our party, climbing along further up hill, stumbled and sent two lava slabs hurtling down very close to one of the birds, she barely moved.

The nests were well-formed masses of debris brought from the water, chiefly dried sea-weed, desiccated starfish, fish bones and other aquatic jetsam. The wings were very small, held close to the body ordinarily but out sideways at a sharp angle when the bird was sunning itself. When I approached closely or waved my hat the bird rose high on her toes, opened and snapped



CLOSE-UP OF A NESTING CORMORANT

Flightless Cormorant sitting on its nest and single egg



ONE OF OUR CORMORANTS IN TAGUS COVE

Flightless Cormorant swimming with body immersed in the waters of Tagus Cove.

her mandibles, uttering a regular cormorant croak, but louder and more resonant than that of our common species.

After we had taken quantities of film and photographs from all possible distances and positions, Gilbert Broking and I approached. When close I seized her as quickly as possible, reaching for the mandibles, but like a flash she dodged, leaped off her nest and when I seized her body, she raked my hand fore and aft with the cruel curved tip of her beak. Three times she went to the bone before I could secure her. Broking had meantime rescued the single egg. I carried her down to the boat and handed her over without further mishap to one of the party. I then captured the other bird, getting full measure of wounds from her as well. The quickness of the head and neck was in marked contrast with the slow gait of the birds on land. Their usual mode of progression is an awkward waddle, the whole body of the bird moving in rhythm with the short leg and great webbed feet. When they meet an obstruction, as a lava block, they bend down a little and leap upward with both feet at once, sometimes clearing six inches and often resorting to a series of penguin-like hops, wholly unlike the habit of any species of flying cormorant. When disturbed by me and during the few seconds when I fumbled my grip and the bird was attempting to escape, it fell flat on its whole length and pushed ahead with its webbed feet, recalling the gait of certain Antarctic penguins

when going full speed over hard snow or ice. The eggs are elliptical in shape, of a pale bluish-green, much concealed by a whitish deposit of lime and about one and three-quarters by two and three quarters inches in size. These are the giants among cormorants, lack of flight having resulted in a decided increase of dimension and body weight. The larger of the pair which I caught alive weighed eight and a half pounds as against an average of six and a half pounds of those which I have collected in British Guiana. Compared with the Farallone cormorant the percentages are as follows: The Galapagos birds are one-third longer in total length, the culmen is one-third longer, the tail is nine per cent longer, and the wing is forty per cent shorter than the Farallone cormorants. Although the Galapagos cormorant appears to be the largest of living cormorants, yet the recently extinct Pallas cormorant of Bering Island, which became extinct about one hundred and eighty years ago, reached a weight of fourteen pounds. As an example of wing degeneration our Tagus bird is even more striking than the classic great Auk, for while in the latter the wing formed twenty-four per cent of the bird's total length, in the cormorant this relative measurement is only about nineteen and a half per cent. As we might expect, the legs and feet are large and of great strength. The swimming webs are aided by an additional expanse of skin in the form of a broad, stiff flap extending down the tarsus. They swim much lower in the water than other cormorants, often with



A NESTING CORMORANT AT HOME

On the terrible slopes of Albemarle Island, where a single misstep would send one to the waters of Tagus Cove with an avalanche of clinkers.

only the head and neck out, the back being completely submerged. When diving the body is humped suddenly forward or actually thrust up, forward and down in a real forward dive. Long distances can be covered under water, the wings held loosely, but motionless, while the great totipalmate webs curl and uncurl with great power, and a machine-like regularity.

The stomachs of these birds contained the following: number one, three eels, two *Seytlichthys miurus*, and one *Gymnothorax dovii*; number two, a good sized octopus; number three, one small fish, well digested.

Like most of the other birds which live among these black lava islands, the cormorants are

dull in color. The bill, pouch and feet are all dusky brown or black, while the plumage is drab brown, with sometimes a little greenish iridescence on the upper surface, set off by a few white hair-like, feather filaments on the head and neck. The eye is the only exception to this color scheme, being of a clear glittering Italian blue.

The inconspicuousness of these birds, large as they are, is attested by the fact that they escaped the attention of Darwin, and all expeditions down to twenty-five years ago. They are confined to parts of the coast of Narborough and the adjoining western side of Albermarle, and are very near the danger line of extermination. One of the last expeditions to the Galapagos killed twenty-six of the birds, and as they have been thoroughly measured and examined, it is to be hoped that very few additional ones will be needed.

The two females which I captured alive, are as I have said, in perfect health today after seven months in the Zoological Park. I secured the two eggs and the nests complete. Being by this

time thoroughly laden down with specimens and photographs and every container overflowing, there was nothing to do but to remove my shirt and wrap the nests carefully up in it.

From a landscape which superficially seemed utterly barren of life, we had extracted the greatest possible profit to be gained from photographing, both stills and moving pictures, paintings in water colors and oils, specimens of all kinds, plants, flowers, minerals, insects, fish, lizards, birds' nests and eggs, and notes scrawled on every imaginable scrap of paper.

At 10:30 a. m. we drew up the anchor and steamed from the cove, after as strenuous a five hours as most of us had ever spent.

PETS AND SUPER-PETS

By RUTH ROSE

Photographs by William Beebe and John Tee-Van

PET goldfish have always seemed to me like the last word in undesirability, yet only five petless days had passed on the *Noma's* southern way when we had an inch-long triggerfish affectionately named Joey, whose smallest act was solicitously watched and whose untimely death was mourned sincerely. A yacht

to come to terms, however, so I reluctantly parted from him, but I was haunted by regretful memories of the intense frown on his worried little face. Two days later I succumbed to temptation and set out to find a fat woman in a black dress, of whose name and address I was completely ignorant. In crises of this sort, cab-drivers are often reliable guides, philosophers, and friends. The situation having been explained to one, of African-West-Indian extraction, we drove slowly up and down the



A CONOLOPHUS ENJOYING A SIESTA.

without a mascot is unthinkable, yet we remained in this miserable state until we reached Colon.

The day we arrived, I met on the street a very fat woman who was evidently proceeding to a new home, as all her household goods preceded her on a hand-barrow. Two small monkeys clung to her mountainous shoulders, and in the barrow a larger one was couchant on a field of bedding that was anything but argent. One of the small monkeys caught my eye; though he was only of the common or hand-organ variety known as *Cebus*, his coat of rust and tan was unusual. His owner and I failed

streets of the town, pausing now and then for a shouted colloquy in Spanish with shop-keepers on the sidewalk. At length an old woman in a purple dressing-sacque seemed to recognize the description of *My Lady of the Monkeys*, and set off at a brisk trot to show us where she lived. Arrived at the place, I went trustfully into a pitch-black room, which opened directly from a narrow alley.

The only article of furniture in the small square room, in which an entire family lived, was an enormous white iron bed, and on it, inextricably tangled in yards of string and each others' arms and legs, were the three monkeys



GALAPAGOS MOCKINGBIRDS

They were an astonishing study in fearlessness.

I had seen on the street. After cautiously cutting them loose, the entire mass was carried into the alley to enable me to pick out my little Puzzled-Face. Negotiations satisfactorily concluded, I bore him away to the waiting cab, and as the beloved black faces of his former owners receded in the distance, he hung over the back seat of the open cab with out-stretched arms, giving vent to such screams of anguish at this outrageous proceeding, that, with a fine disregard of sex, he was at once named the Sabine Woman.

This was only a temporary name. I later christened him Chiriqui, after that region of Panama from whence he came; but because of his deplorable table-manners, some members of the party insisted on calling him Gatun Spillway.

For the first few days he was distrustful of his new environment, but it was not long before he was thoroughly reconciled to us, and anyone who appeared on the after-deck, where he was tied to the mast, was greeted with friendly chattering and joyful little leaps.

While we were among the islands, he was occasionally taken ashore, the only monkey, so far as we know, ever to set paw on the Galapagos.

Our next pet was an undesirable one from Chiriqui's point of view. The first day we spent on Indefatigable Island, some of the over-zealous sailors brought aboard a great blue heron

which they had partly disabled in capturing. He was released on top of the awning that covered the after-deck, and for several days he sat there gloomily, brooding over his wrongs and his injury. At length he began to take a sufficient interest in life to eat the fish that we threw him, but he showed no inclination to fly, and kept strictly to his own quarters, voyaging with us from island to island like a tourist. Presently he began to venture nearer the rail that separated him from the boat-deck, and then the feud commenced between him and Chiriqui.

From that time Vincent, the heron, became an unmitigated nuisance. He hated Chiriqui with a deep, dark hatred, and his boldness hourly increased. The whole of the yacht was his to stroll upon and at first it was quite startling to have Vincent appear suddenly round a corner, with his sinister, high-stepping prow. He would wait until he thought everyone was safely out of the way, and then he would stealthily bear down on poor little bound Chiriqui like some dreadful doom. He could have impaled the monkey with one direct blow of his strong bill, a fact of which his victim seemed fully aware, for he usually took refuge under a chair, if one was near, and then lifted up his voice for a rescue.

We patiently endured Vincent's trying ways, but we were not sorry when, on our return to Indefatigable, he appeared to decide that his sight-seeing trip was over and took wing.



A COLLECTION OF MARINE LIZARDS
Amblyrhynchus Lizards on Eden Rock.

The three little penguins that we took from Tagus Cove were charming pets. After their first fright, during which they inflicted a few lacerations with their sharp beaks on their would-be admirers, they became popular members of the menagerie and at feeding time they were sure of a friendly audience. They were so tame that it was difficult to keep them at arms' length long enough to take a photograph, and they crowded underfoot in competition to be stepped on. When released from their cage, they waddled busily about with stumpy little wings outstretched, looking appealingly up into each person's face in an anxious way which meant that fish were ardently desired. The smoking-room, opening from the after deck where they lived, was a favorite resort once they managed to scramble over the high threshold, and here they inspected the phonograph with great interest.

The smoking-room had a fascination for our sea-lion pup, also. His name was Benjamin and having watched from the rear his progress down the deck, we fancied that we had discovered the original of the famous Chaplin walk. After prodigious efforts, he would hoist himself over the threshold, and fall with a flop into the smoking-room, where he climbed over the leather seats 'round the wall, and on one occasion was found reposing comfortably on top of the phonograph, partly in and partly on some one's new Panama hat. One night he

escaped from his cage and in the course of his nocturnal explorations fell down the hatchway into the Taxidermist's bunk, and the same night one of the sailors sleeping on deck was roused by Benjamin creeping under his blanket; we were told next morning that Benjamin had jumped overboard, but we always suspected that he was perhaps assisted on his homeward way.

At Tagus Cove we had captured two flightless cormorants from their nests far up the steep, rocky cliffs. It was possible to approach to within a few feet of them, but they fiercely resented the attempt to remove them from their large, greenish-white eggs, and their resentment was expressed by sharp, curved beaks, and powerful neck muscles, operating on the hands of their captors. The morning after they were brought on board, we found that one of them had laid us an egg, like a well-trained fowl, but they were a long time in recovering from their fear of us, compared to the penguins, who made themselves at home almost at once. The cormorants refused to eat for many days and forcible feeding was resorted to at last.

From Eden Rock we took away a large collection of live lizards—the rough black creatures that are distinguished by being the only marine lizards in the world. A wire-covered boat, on the upper deck, was filled with their sprawling, wrinkled bodies, which received a daily dousing with salt water. The great mahogany-and-orange land lizards, *Conolophus*, occupied an



A CONOLOPHUS INNOCUOUS

To handle a Conolophus in any other way was to invite trouble. Their jaws were like steel traps.



OUR SEA-LION BENJAMIN

The travels of Benjamin on shipboard were extensive, and varied.

enormous square box on their same deck, and nothing could have been in more striking contrast than the habits in captivity of these two creatures, so closely related. Amblyrhynchus, the marine lizard, had never attempted to bite, no matter how roughly handled; he endured what came in almost complete passivity, and passively ignored food of any description. Conolophus, his cousin from inland, fought like mad, bit like a fury, and ate like a pig!

During the four marvellous days that we spent at Tower Island, anchored in Darwin Bay, we acquired three nestling sea-gulls—*Creagrus furcatus*, the Fork-tailed Flesh-eaters. The first and smallest one looked so much like a well-known advertisement that no other name than Bon Ami was possible. The next day another was brought aboard and behaved so peevishly toward his companion, especially at meal-times, that he forthwith became *Sale Type*. The third one was much larger and had lost all his fluffy nestling looks. He was called

Mon Copain, but in practice he was so uncomradely that he was separated from the others, and dwelt in solitary splendor.

We brought three Galapagos mockingbirds with us, caught by means of bird-lime spread on twigs. They were an astonishing study in fearlessness and adaptation to hitherto undreamt-of circumstances. Imagine birds that had never before seen men, snared by means of a sticky mass that held them fast by the feet, handled for some minutes while they were being freed and the lime washed off, and that fifteen minutes later, ran confidently to the bars of their cage to take worms from our fingers! The next day they were actually singing their sweet, liquid song when I came to refill their water-cups. It was interesting to see that in the cage their habits conformed to what we had observed of them on shore—that they seemed to spend less time on their perches than in running briskly about on the ground.

Two Galapagos hawks, several of the little scarlet-checked lizards, a lovely dove native to the islands, an aquarium of rainbow-hued fishes from the pools of Darwin Bay, and one of the great tortoises from which the archipelago receives its name, made up our list of live specimens when we reluctantly steamed homeward. At Panama the menagerie was considerably augmented, and from Mr. Beebe's forthcoming book, I quote the following concerning our most popular acquisition:

"At Panama I made the acquaintance of Sindbad, and as I found him fallen among low company I rescued him and added him to our personnel. Sindbad was only an alias—his real name was *Ateles ater*, and less formal acquaintances spoke of him as a black spider monkey. I found him tethered in a narrow street, with a line of Panamanians ten feet distant absorbed in the jolly game of seeing who could spit upon him from that distance. There were two small palms in sight and Sindbad's whole attention was fixed upon these; his dignity, his abstraction from his immediate environment was complete. The native competitors must have had much practice—they were very skilful, and while I am not usually a kill-joy, yet I stopped this out-door sport by purchasing Sindbad then and there. As one long arm went around my neck and he looked inquiringly into my eyes, I almost agreed with Bryan—in fact, I am quite sure many human beings have not the slightest kinship with such a bandarlog gentleman as Sindbad! He proved to be gentle, very self-contained and with a delightful sense of humor and love of play. Only when suddenly alarmed did he ever threaten to bite, and after punishment never harbored a grudge. He walked upright constantly, balancing with both arms raised high like a gibbon. When walking on all fours the fingers were always doubled under, down to the knuckles. In fact, they were primarily hooks for catching hold of branches, even the thumbs having been completely lost in the course of adaptation for a hanging and swinging organ.

"Sindbad was the only monkey I have ever known who laughed. Many monkeys grin, like dogs at play, but even when at the climax of a game, they seem never to make a sound. But Sindbad really chuckled when tickled, or when he was wrought up with the excitement of the game he invented, of leaping down upon one from a height, and then trying to escape before being caught and rolled over. The

chuckle was a series of jolly sounds which expressed audible mirth in a most astonishingly human way.

"When curious about anything which he did not understand, Sindbad uttered a single, high, clear note, and when he saw food approaching, he gave a series of shrill chuckles, quite unlike his hysterical giggle when playing, but obviously related in timbre and expression of satisfaction. He enjoyed teasing the puppy Bonzo, tweaking his ear, or tugging at leg or tail, and then allowing him to get almost out of reach before hauling him back casually by the tail. When the pup ceased to consider it play, and growled, the monkey at once respected the change of mood and stopped his teasing. This spider monkey showed far more intelligence in regard to his cord than the cebus and other monkeys we had, usually holding it clear of entangling objects by a twist of his tail. When the leash was entwined around a chair leg or staunchion, he would try several ways of freeing it, and eventually follow it back from his belt along the line of the rope until quite clear."

We had besides a pair of large doves, a dozen brilliant little parrakeets, two lavender jays (most lovely in color), a three-toed sloth, and two strange marmosets, whose cranial development, or rather, lack of it, should have denoted strong criminal tendencies. If they had anything of the sort, they concealed it very well, for gentler, more timid little creatures were never seen. With a zoo of this size and variety, time did not hang heavily on any one's hands on the return trip, and in rough weather considerable ingenuity was displayed in packing the many cages in secure positions and lashing them to any stable portion of the yacht.

TERMITES

TERMITES or white ants are small folk, but mighty in their achievements. Their part in the jungle world is to devour and destroy dead vegetation—twigs, branches and trees, the moment life has left them. Their reward is to live in highly organized communities, with many castes, king, queen, soldiers and workers, to build roads and tunnels and elaborate nests and to multiply beyond count. Their kismet is to live out a short but ever busy life, with the very probable end of being eaten by anteater, or pheasant, peacock or junglefowl.

The photograph was taken in the far interior of the Malay Peninsula, in Pahang, of a



ARMY OF TERMITES

A well engineered trail; a widened path well buttressed, leading to the underground nest.
Photographs of Termite and Tree Fern by William Beebe.

well engineered termite trail, on the side of a bank, the path widened and buttressed in places and leading into a ground nest. A steady line of worker termites flows past, with big-jawed soldiers on guard, both along the line of march and at the entrance of the nest. The photograph shows a stream of hundreds of the passing insects, with the occasional traffic soldiers, and a group of watchful guardians on the lookout for danger from above the nest.—*W. B.*

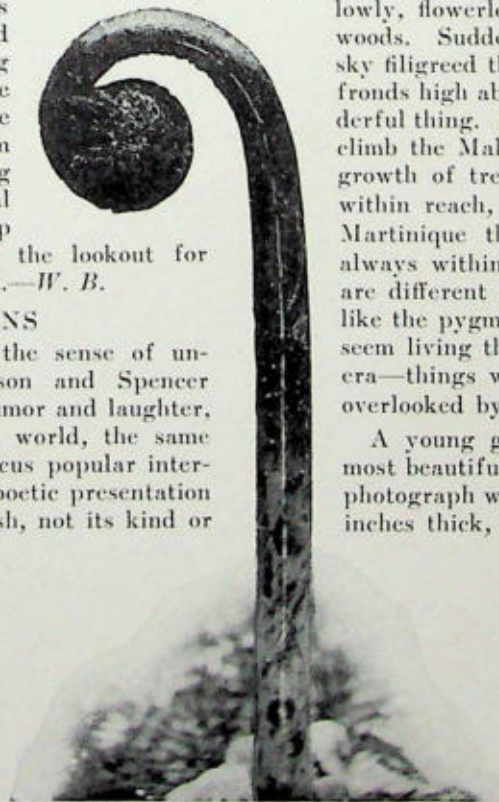
TREE-FERNS

EXAGGERATION in the sense of unusual size, so Bergson and Spencer agree, lies at the base of humor and laughter, and so too in the natural world, the same quality will attract and focus popular interest, when a scientific or a poetic presentation fail. It is the size of a fish, not its kind or color which holds your circle of listeners, and to walk beneath a grove of bamboo grasses one hundred feet in height and think of the lawn at home is startling.

To those of us who have spent most of our lives in northern climates tree-ferns are probably the greatest surprise—the

most remarkable feature of tropical novelties. Through all unwintery seasons we have known the maidenhair, the brakes and the walking fern, lowly, flowerless friends of our northern woods. Suddenly to look up and see the sky filigreed through great, widespreading fronds high above our heads is a very wonderful thing. For miles and miles one may climb the Malay mountains through dense growth of tree-ferns, with never a frond within reach, and in a day's motoring in Martinique the great lacery plants are always within sight. The wooded trunks are different from other living boles, and like the pygmy hippopotamus and hoatzin seem living things from some far-gone-by era—things which have been shelved and overlooked by *time and change*.

A young growing frond is one of the most beautiful curves of life. That in the photograph was a giant, the stem full three inches thick, yet it looks like the greatly enlarged tongue of a butterfly. I have seen New England hummingbirds glean golden down from similar but tiny stalks for their nest, and in Borneo the most delicious greens I have ever eaten were uncurled frond springs gathered patiently by great naked Dyaks.—*W. B.*



TREE FERN

"like an enlarged butterfly's tongue."

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A DIAMONDBACK—THE EPICURE'S TURTLE *Cover*

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RED-BREADED SUNFISHES IN THE NEW YORK AQUARIUM

From a photograph by Elwin R. Sanborn

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MAKING THE AQUARIUM LARGER AND BETTER

By C. H. TOWNSEND

SINCE the New York Aquarium passed under the management of the Zoological Society twenty-one years ago, eight cities in this country have built public aquariums, some of which are of considerable size. During this period our own aquarium, although improved in other respects, has not been able to increase its collections except in so far as was possible through enlargement of some of its original exhibition tanks. Occupying all available space within its heavy walls, growth was virtually arrested. A condition of retarded development is not wholesome for an institution any more than it is for a human being. The public is apt to neglect a concern that seems to be at a standstill. There has been no expansion of the building either in height or area since it was devoted to the uses of an aquarium.

The improvements which were commenced in August, 1923, will not only permit of an increase of fully one-fifth in the number of tanks but will provide equally desired space for administrative purposes. The alterations now in progress have already added a third story at the front of the building above the old office rooms, and thus made possible the creation of more exhibition space in the rear. What is now being done is more in the nature of a rearrangement of the mechanical equipment, than any extensive enlargement of the structure itself.

Immediately following certain reconstruction work in the rear of the Aquarium, will come the building of more and larger tanks.

The narrow entrance corridor has already been widened into a roomy foyer, beyond which

registering turnstiles will be placed, while the hitherto unused rear corridor will become a convenient point of exit, contributive to relief of congestion at the entrance.

The stocking of the more capacious new tanks with larger forms of marine life than is now possible, will be a matter of decided interest to visitors, now numbering about two millions of persons a year.

More than a year ago the Zoological Society established a new pumping and heating plant in the front basement of the Aquarium at a cost of nearly \$70,000. It will also assume the cost of reconstructions connected with the increase of exhibits. The city has made appropriations for the third story improvement amounting to \$94,000.

The supplies and movable equipment of the Aquarium, its numerous large shipping tanks and seines, its store of pipes and valves, its feed-room supplies, repair and cleaning outfits, which have always been stowed in odd corners for sheer lack of space, are now provided for. The office, library, laboratory, wash-room, etc., all hitherto crowded into quarters that have been filled to overflowing for years, are now adequate to the demands made upon them.

A very notable improvement is a dry furnace-room, the old room having always been subject to inundation during high tides.

The improvements as a whole have been greatly needed and the Aquarium is now larger than before and better equipped for efficiency.



ODENHEIMER AQUARIUM
Audubon Park, New Orleans, Louisiana.
From a photograph by H. J. Neale.

TWO NEW AQUARIUMS

By C. H. TOWNSEND

WITHIN six months two public aquariums have been added to the half dozen already in existence in this country—one on the Pacific coast at San Francisco, the other on the Gulf coast at New Orleans. The Atlantic coast region is already favored with four aquariums, those at Boston, New York, Philadelphia and Miami. By including the small aquarium connected with the headquarters of the Bureau of Fisheries at Washington we can credit five of these aquatic museums to the eastern coast.

The Great Lakes have two aquariums, those at Detroit and Chicago, the latter being at present of rather small size and limited, like that at Washington, to fresh water exhibits. Chicago, however, proposes something very much larger and has submitted elaborate plans for our inspection. The small aquarium at Honolulu, celebrated for its gorgeously-colored tropical fishes, should be added to the United States list, making ten in all.

Europe has not many more, at least of the larger kind, such as those of London, Brighton, Amsterdam, Berlin and Naples. The new aquarium of the London Zoological Society, situated in Regent's Park, was opened in October, 1923, when fresh water exhibits had been installed. The equipment for marine exhibits has been installed since then. The New York Aquarium has already contributed several American species to the London collection and has sent to San

Francisco specimens of that peculiar survivor of an otherwise extinct group, the horseshoe crab (*Limulus*).

The Steinhart Aquarium in Golden Gate Park, San Francisco, has fifty-eight glass-fronted exhibition tanks, capable of holding 64,500 gallons of fresh and salt water. There is an outside reservoir holding 100,000 gallons. There are pools both inside and outside the building for seals and turtles, having a total capacity of 140,000 gallons of water.

The exhibits in the glass-fronted tanks consist of both marine and fresh-water fishes. The tropical fishes are brought from Honolulu.

This aquarium, the gift of Mr. Ignatz Steinhart, was opened on September 29, 1923. Its cost exceeded \$300,000. Visitors for the first month numbered over 230,000 persons. The aquarium is under the management of the California Academy of Sciences.

The aquarium in Audubon Park, New Orleans, is the gift of Mr. Sigmund Odenheimer of that City. It was opened to the public on February 4, 1924, the estimated attendance on that day being 6,500. The week day attendance since that time has been about 2500, the Sunday attendance being about 5,000. This aquarium is smaller than that of San Francisco. The building presents a very different external appearance, being circular in form, but is equally attractive architecturally.

The glass-fronted exhibition tanks, fifteen in number, are equipped for both fresh and salt



THE STEINHART AQUARIUM
Golden Gate Park, San Francisco, California.

water. The collections at present consist chiefly of fresh-water fishes. This aquarium is under the management of the New Orleans Zoological Society.

The original plans for these aquariums, like those of Boston, Detroit and Miami were brought to the New York Aquarium for study and revision.

THE SHARK SUCKER'S DISC

By IDA M. MELLEN

THE Rev. J. G. Wood, in his good and famous old Natural History, of which E. P. Dutton & Co. of this City have recently issued a new, revised edition, states that the disc removed from a dead shark sucker will adhere to any smooth object with "tolerable firmness." He says also that "when the fish presses the soft edge of the disc against any smooth object and then depresses the laminae, a vacuum is formed, causing the fish to adhere tightly to the spot upon which the disc is placed."

This theory of adhesion seems to be slightly in error.

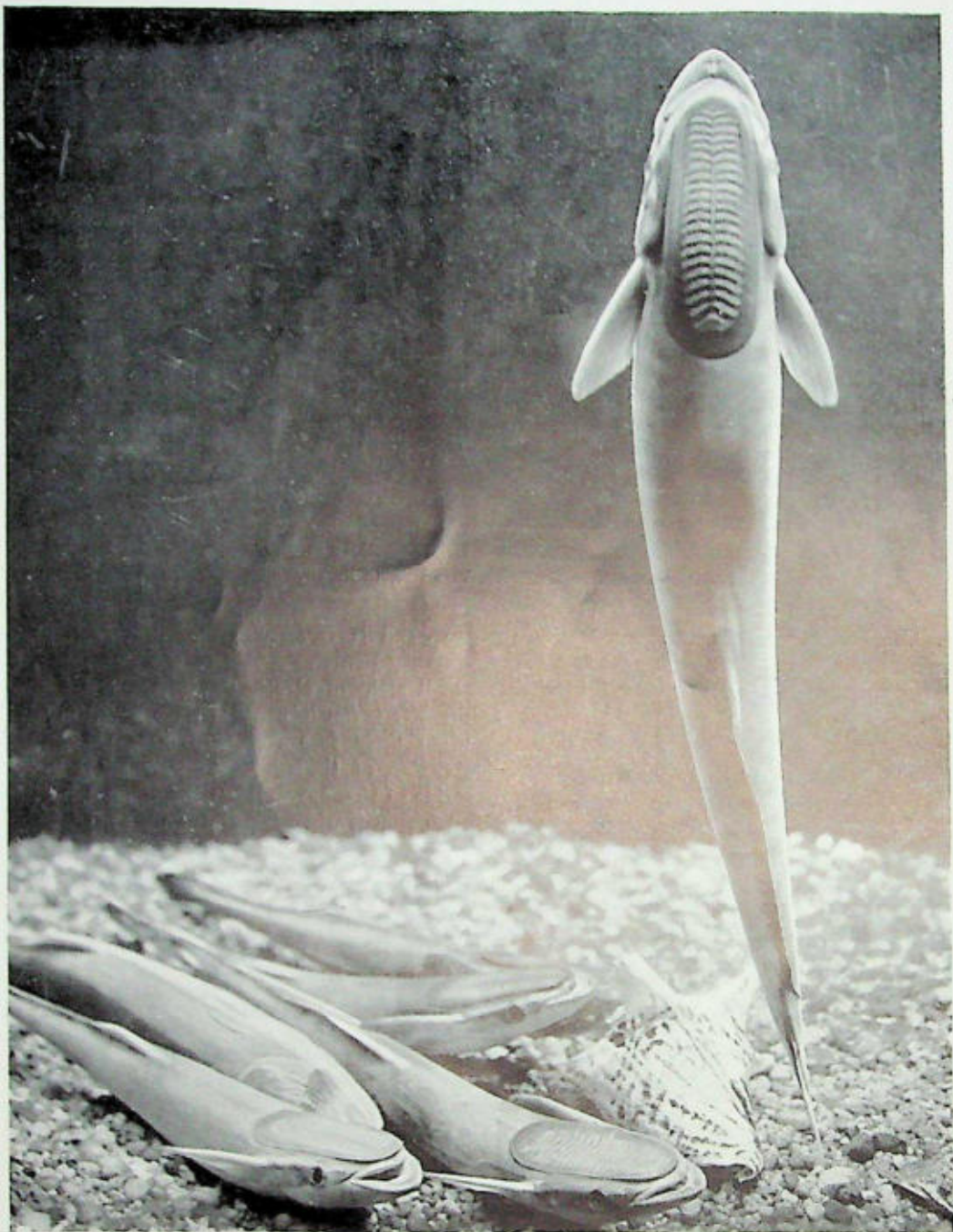
The disc of the shark sucker (*Echeneis naucrates*)—in reality a modification of the anterior dorsal fin of the fish—is tongue-shaped and composed of twenty plates or laminae, surrounded by a border of smooth flesh. The forward end of each plate is attached, while the

rear end is free, excepting that each plate is connected in the center to the preceding, by a small strip of elastic tissue that lies flat when the disc is not in use and rises with the laminae when their free ends are opened. The constriction of the plates in the center by these strips of tissue, results in the formation of forty open spaces when the plates are raised.

Across the free end of each plate are ridges composed of two rows of tiny, tooth-like projections or spines. If we run our finger up and down the disc, we find that from front to back it is smooth, but in the opposite direction it resembles a miniature nutmeg grater because of these spines besetting the edges of the plates. In fact, if we run our finger forward over the ridges and then over the fine teeth with which the upper and lower jaws of the fish are carpeted, we shall notice little difference in the peculiar roughness of the two processes.

On first discovering these tooth-like projections or spines on the laminae, we jump to the conclusion that the fish must adhere to its host by swimming forward until the disc is applied, then jerking slightly backward (or waiting for the host to move forward) in order to attach itself by means of the spines on the disc, to the surface selected; that is to say, without recourse to suction. Under the microscope each spine—smaller than a pinpoint—appears as rounded and closed, having in itself no sucking power.

A disc removed by the writer from a dead



SHARK SUCKERS IN THE NEW YORK AQUARIUM

The method of attachment to an object is admirably illustrated by the open disc of the specimen clinging to the glass. In the specimens lying at rest, the disc is closed.

From a photograph by Elwin R. Sanborn.

specimen of one of these fishes, does not adhere to slippery objects such as varnished wood or leather, but catches a bit of cloth in the same manner that it probably catches the granular

skin of the shark and some other hosts. In this manner alone, however, it is improbable that the fish could adhere to the slippery glass of an aquarium tank, or lift a bucket of water

or a sea turtle, as shark suckers in the New York Aquarium have done.

When a shark sucker attaches itself to the glass front of an aquarium tank, we are afforded a rare opportunity to observe its method of attachment to smooth surfaces by suction. The accompanying photograph admirably illustrates this subject, showing shark suckers lying on the bottom of a tank with their discs closed and one specimen adhering to the glass front of the tank with its disc open.

The shark sucker in the sea attaches itself to codfishes, albacore, sharks, whales, porpoises, turtles, ships and other objects, and though suction must be generally employed, it seems reasonable to conclude that the work of the spines in first effecting adherence to the average host is deserving of more credit than it has been hitherto accorded. It is evident that the free ends of the laminae, beset with little spines, fasten to an object selected for attachment, and then open. In forty sections of the disc a vacuum is thus created, so powerful that a fish weighing but one and a half pounds has lifted a sixty-three-pound turtle!

It seems, therefore, that Wood's description of the method of attachment might advantageously be altered to read—"When the fish takes hold of its host with the tiny spines, of which there are two rows on the free end of each of the laminae, these laminae open at that end and thus create a vacuum, causing the fish to adhere tightly to the spot upon which the disc is placed."

WHY SWORDFISH STRIKE SHIPS

By C. H. TOWNSEND

IN the issue of this Bulletin for November, 1923, the writer adduced certain evidence that the attacks made by swordfishes on vessels and whales were the result of over-eagerness in striking at schools of fishes seeking protection under such objects. The account of one whaleman who observed a swordfish following a school of albacore under his vessel is worth quoting again in this connection: "It was apparent that he feared to make his upward dart against the bright copper bottom of the strange monster floating above. The swordfish approached closer and the albacore darted away. The swordfish was almost instantly in the midst of the flying throng, and with cut and thrust of his sword, too rapid for the eye to follow, he killed several instantly. As I observed his motions I saw an explanation why the swordfish occasionally

strikes the bottom of a vessel and drives his formidable weapon through the planks. It is simply done in his over-eagerness to catch his prey."

The present writer's comment on this performance may also be quoted: "Many oceanic fishes have the habit of sheltering in schools beside or under slow moving vessels, and thus bring the vessel in line with the rush of the hungry swordfish. They also seek the shelter of whales, thus subjecting the latter to the chance of being struck."

Dr. E. W. Gudger of the American Museum of Natural History has kindly supplied further evidence in support of this view written by Frederick Debell Bennett,* a whaleman, whose account is quoted as follows:

"On the following day, the albacore around the ship afforded us an extraordinary spectacle. They were collected close to the keel of the vessel in one dense mass of extraordinary depth and breadth, and swam with an appearance of trepidation and watchfulness. The cause of this unusual commotion was visible in a swordfish, lurking astern, awaiting a favorable opportunity to rush upon his prey when they should be unconscious of danger or away from the protection of the ship. The assembled albacore continued, in the mean time, to pass under the keel of the vessel from one side to the other, often turning simultaneously on their side to look for the enemy; their abdomens glittering in the sun as a wide expanse of dazzling silver. It was evident that the swordfish desired but a clear field for his exertions; and in the course of the day we observed him make several dashes amongst the shoal, with a velocity which produced a loud rushing sound in the sea: his body, which when tranquil was of a dull brown colour, assuming at these times, an azure hue. It is, probably, as a precaution against the attacks of this monster, that albacore, and some other tropical shoal-fish, attach themselves to ships and large whales: the close vicinity of a large body, being sufficient to deter the swordfish from making his usual impetuous thrusts amidst the shoal; the which, when rashly attempted, have given rise to the appearance of the broken rostra

* Narrative of a Whaling Voyage round the Globe, from the year 1833 to 1836. By Frederic Debell Bennett. In two volumes. London: Richard Bentley, New Burlington Street. 1840.

of these fish impacted in the planks of ships, or carcasses of whales, as is not unfrequently noticed.' (Vol. I, pp. 270-272.)

A careful examination of the older books written by whalers, would doubtless yield further accounts of the behavior of swordfishes under similar circumstances.

There is therefore decided evidence that the swordfish strikes vessels *accidentally* when *seeking food*, and that the finding of his broken

weapon in the hull of a vessel is not proof of an attack on the vessel itself. Professional swordfishermen are of course well aware that the swordfish, after it has been harpooned and is dashing wildly about seeking relief from the dragging line and buoy, is decidedly dangerous. There are many instances in which it has rammed the row-boat sent out to pick up the buoy, and even the schooner itself should it come in line with its frenzied rushes.



ENTRANCE TO THE MARINE AQUARIUM, MADRAS, INDIA

AN AQUARIUM IN INDIA*

By S. T. MOSES, M. A., F.Z.S.

*Zoological Assistant to the Director of Fisheries,
In charge of the Marine Aquarium at Madras,
Member of the New York Zoological Society.*

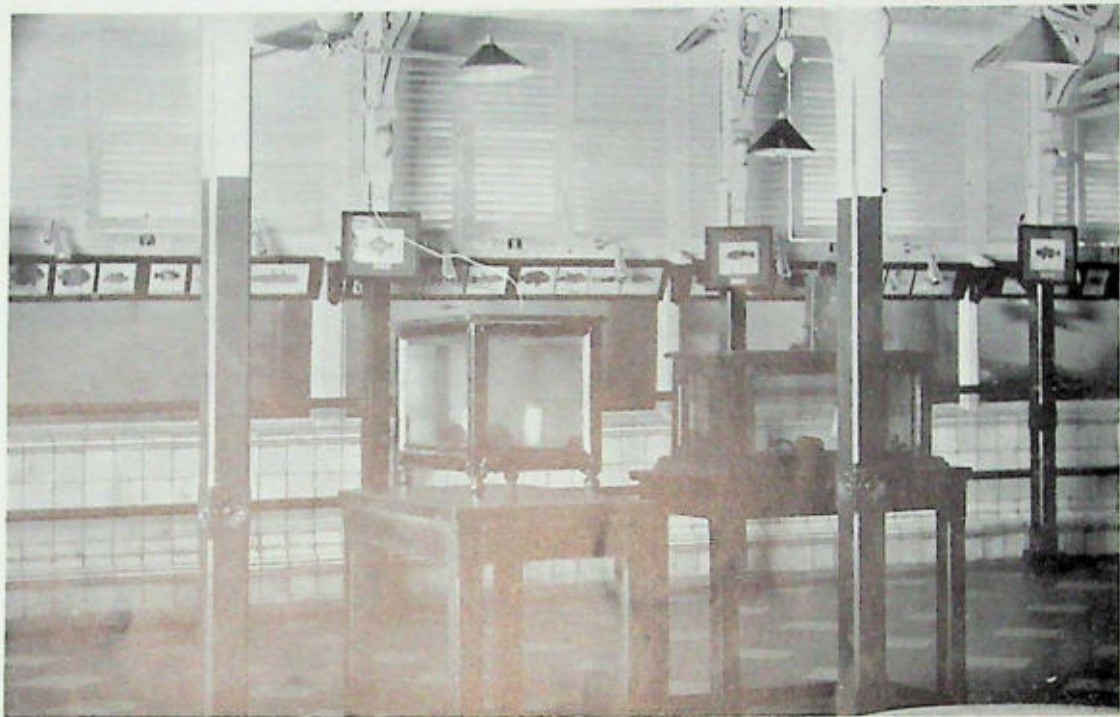
MADRAS possesses in the Marine Aquarium a unique institution, the only one of its kind in India. In 1905, Lord Ampthill, Governor of Madras, requested Mr. Edgar Thurston, Superintendent of the Government Museum, to secure plans and estimate. The actual expenses in building were 17,604 rupees.

* Condensed from a detailed account of the history, equipment and special features of the Madras Aquarium furnished by Mr. Moses at the request of the Director of the New York Aquarium.

The institution was "an extension of the Madras Museum and an annexure to the Presidency College." It was placed under the control of the Superintendent of the Museum, assisted by a Committee of Naturalists.

The Aquarium was opened to the public in October, 1909. Its control was transferred to the Department of Fisheries in March, 1919, and its management placed in the hands of the Zoological Assistant to the Director of Fisheries, which resulted in an increase in receipts which is maintained until to-day.

The building is an unpretentious edifice situated opposite the Presidency College on the "Marina." The funds allotted did not permit of the erection of an extensive building. The



INTERIOR VIEW—RIGHT—MARINE AQUARIUM, MADRAS, INDIA

In the foreground are shown some of the table aquaria.

main entrance leads into a vestibule with two turnstiles, one of which carries an automatic recorder and is that through which visitors enter; the other, an exit turnstile, moving only in one direction, prevents passage inward.

The lofty rectangular hall for exhibition tanks measures fifty by thirty-five feet. There are ten masonry tanks each measuring seven feet in length, by four feet back from the glass fronts, with a depth of three feet. The backs of some tanks are lined with glazed tiles or with rock-work. The glass fronts are single plates one inch thick. The bottom of the tanks is three feet from the floor, and the barrier rails in front three feet six inches high.

In the center of the hall is a fresh-water pond with a central fountain. There are distributed in the hall sixteen table aquaria. The wall space of the hall is utilized for cabinet cases of Madras mollusks, crustaceans and jars of marine animals in fluid. The ten wall tanks and many table aquaria contain salt water. Sea water circulates from tank to tank through holes cut in the dividing walls. The circulatory system consists of three underground reservoirs, a high-level reservoir, a sand and pebble filter bed, and galvanized iron piping.

The water supply flows by gravitation from the high-level supply tank to the exhibition tanks. Once in a fortnight, fresh sea water is introduced through a pipe extending to the sea wall. It mixes with the stored overflow and enters the tanks after being filtered. The filtration of sea water, though disadvantageous as it deprives fishes like the seahorse of their usual plankton food, is necessary, the shore water of the Madras coast being disturbed by surf. The use of water circulated over and over again, though originally meant as a measure of economy, has become a permanent feature as fishes do not seem to be affected by it. Each tank is provided with a clean-out pipe at the bottom through which it can be emptied when necessary.

As the fishes live here permanently under conditions of over-crowding, the aeration of the water by mere inflow is inadequate to support life. Aeration is accomplished by mechanical means. Air is piped from compressor cylinders, under pressure of twenty atmospheres, the end of the air tubes in each tank being fitted with a Berkfield Filter Candle, through the porous material of which air escapes into the water.

The specimens with which the Aquarium is stocked are all obtained locally, all being se-



INTERIOR VIEW—LEFT—MARINE AQUARIUM, MADRAS, INDIA
Glass fronted wall tanks in the background, above which are illustrated labels.

sured by local fishermen within a few miles of the building. The more brightly colored and rarer a form is, the higher the price paid.

The exhibits include the checkered and striped dogfishes, blackbanded tiger sharks, torpedo rays which give a mild electric shock when handled, sea eels, sucker fishes which cling to sharks, yellow-finned butterfly fishes, trigger fishes, snappers, surgeon fishes, flying dragons, sea catfishes, anglers, puffers, sea hedgehogs, sea perches (*Serranus*) three of which, each weighing over twenty-five pounds have lived in the Aquarium for over fifteen years, seahorses, sea snakes and turtles.

There are also fresh-water fishes such as gourami, climbing perch, and top minnows, the last useful as destroyers of mosquito larvae.

New arrivals do not feed at first but when they see others feeding the force of example leads them to feed gradually. The food is fish sliced or chopped, shrimp, sand bugs or oyster meat. The seahorse has a plentiful supply of algae in his tank from which he picks minute living organisms.

Most of the brightly colored fishes after a stay in the Aquarium lose gradually much of their brightness and assume sombre hues. They

change color at will: the rosy banded schnapper (*Lutianus*) normally with three bright crimson bands on a white background, becomes completely red, with dark red bands when fighting or struggling for food. The sucker fish (*Echeneis*) is a quick-change artist in making the white stripes disappear. Another schnapper, when seen in the morning is pale white except for the fins which are rosy. In the evening and at feeding time the color of the body deepens to red.

Fishes worry and kill new arrivals if such are introduced during the day. To avoid this they are introduced in the dark or during feeding time.

Once the fishes acclimatize themselves to the life of captivity, they thrive unless they are affected by parasites, gas eye, or become egg-bound. Dead fishes on autopsy are usually found egg-bound or with gall bladder distended and bile duct inflamed. Loss of fishes is sometimes due to over-feeding. With small space for exercise they put on more fat than is healthy.

Anemones, crabs and lobsters do not live more than a week or two, while jelly-fish and octopus do not survive a day.

The Aquarium being small, the levy of a fee

is considered necessary to prevent crowding and to prevent its becoming the resort of mere idlers.

The proposal to build a larger aquarium for which plans were drawn up in 1912, has been abandoned on account of expense.

TYRIAN PURPLE FROM SEA SHELLS

By IDA M. MELLEEN

WITH a certain degree of regularity come to us the questions, "What shells did the Phoenicians use for the famous Tyrian dye?" and "Was not true Tyrian purple more red than purple?"

In these post-war days of difficulty in procuring cloth of fast colors, our interest naturally turns to the subject of dyes, and incidentally to the early manufacture of Tyrian purple.

On the shores of the Mediterranean may still be seen the remains of the ancient dye works where several species of molluscs were crushed in stone mortars and mixed with soda and water for the manufacture of purple. Three species found there are the banded murex (*Murex trunculus*), the straight-spined murex (*M. brandaris*), and the open-mouthed purple (*Purpura patula*); shells averaging three inches in length, immense numbers of which were sacrificed to the human love of colored garments. It is not the shells of the animals, however, but their glands that yield the coloring matter.

Yet the manufacture of purple appears not to have been unique among the Phoenicians. Though opinion is that it began with the Minoans of Crete, it is certain that purple was also manufactured by Egyptians, Assyrians, and some races in the western hemisphere, notably the Indians of the West Indies whom Columbus discovered engaged in this industry after the secret had been supposedly lost for centuries.

As might be guessed, Greek legend has not failed to provide a pretty story about the discovery of molluscan purple, the glory of which it gives to the Nymph of Tyre about the sixth century B. C. Hercules, as the legend reads, was one day strolling along the sea coast with that lady, of whom he was enamored, when his little dog approached with its mouth stained purple. Thereupon the fair one bade her lover see her no more till he could bring her a robe of the same color. Following the dog, Hercules discovered it to be eating *Purpura*.

The legend is not marred by the fact that the glandular fluid from which purple is derived

must be exposed to the sun, where, being originally yellow, it changes first to various tints and shades of green, then indigo, blue, red, lavender and purple; for the change from yellow to purple through these various colors, is exceedingly rapid.

The precise function of the slime gland producing purple in the sea snails (known technically as the hypobronchial gland) is not known, one conjecture being that it is used to glue the eggs to rocks and other objects, another that it serves to protect the gills from foreign bodies.

The question as to whether Tyrian purple was more red than purple is a difficult one; for violet, of course, shades into red, and a variety of shades could be manufactured from the molluscs. Some shades, we learn, were cheap, while others brought prodigiously high prices; and different shades were produced by various blendings of fluid from the several species mentioned, and by various degrees of evaporation. The shades of lowest value were those produced by pounding the shells in mortars and using the entire body liquid, whereas the costly shades represented dyes made from the glandular substance only, carefully dissected out of the animal. It must have been to the cheaper shades, therefore, that Marcus Aurelius referred (and even so he was a better philosopher than a zoologist) when he said, "Your purple is nothing but sheep's hair twisted together and stained in the *gore* of a little shell-fish."

Some accounts say that the color was indelible, an advantage which modern dyes lack, though some present-day dyes made from coal tar will endure as long as the fabric, thus serving our economic needs. On the other hand, it is possible that a long lapse of time may cause some change in Tyrian purple, assuming that it was truly purple, for Oliver Wendell Holmes states that in the burned city of Pompeii the houses are stucco outside and it is stained with Tyrian purple, but now the Tyrian purple is almost red.

According to Sir Philip Sidney, however, Tyrian purple was of a color "betwixt our murrey (a dark reddish-brown) and scarlet."

Dr. C. H. Townsend, Director of the Aquarium and a member of the Council of the Oceanographic Institute, founded by the Prince of Monaco, attended as the delegate of the Institute, the centenary of the birth of Joseph Leidy at the Philadelphia Academy of Natural Sciences on December 6, 1923.

New York Zoological Society



OBJECTS OF THE SOCIETY

☐ A PUBLIC ZOOLOGICAL PARK. ☐ A PUBLIC AQUARIUM. ☐ THE PRESERVATION OF OUR NATIVE ANIMALS. ☐ THE PROMOTION OF ZOOLOGY.

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VOL. XXVII MARCH, 1924 No. 2

A BIBLIOGRAPHY OF FISHES*

By C. H. TOWNSEND

In the course of scientific events, as in other lines of endeavor, it is desirable that there be set up landmarks of some sort by which to measure achievement and advancement. Such landmarks may be the lives of exceptional individuals, as for instance the lives of Linnaeus or Darwin: some intellectual achievement such as the control of the electrical current, or merely the appearance of an important literary or scientific work.

It would seem that the science of ichthyology must now be benefited in just this way by the completion of a bibliography of monumental proportions—a bibliography in three large volumes of more than 2000 pages containing some 45,000 references to the works of over 10,000 authors. A part of this work has been in our hands for several years. It is now brought in

* A Bibliography of Fishes, By Bashford Dean. Published by the American Museum of Natural History.

a third volume, to the year 1914 or the beginning of the Great War. This work is of such a character that all students of fishes and fishery subjects must turn to it, if they would know what has already been accomplished by those who have preceded them. It must even serve the purpose of an encyclopedia of things ichthyological, until such an encyclopedia can be created.

Volume III of the Bibliography of Fishes is the key to volumes I and II and to the Addenda in the first half of volume III, which consist of titles arranged alphabetically under each author. The titles numbering about 45,000 are divided into two classes, those dating prior to 1758 or pre-Linnaean, and all other titles from that year to the year 1914. The latter class constitutes of course the great bulk of the work.

The latter half of volume III consists of a subject index of 305 pages, which is divided into two sections, a Morphological and General section and a Systematic section. Following these sections is a Finding Index of 40 pages, alphabetically arranged. The work of analyzing and editing this mass of literature continued through a period of six years, the result of which is this elaborate subject index, which is presented in 116 headings or topics, beginning with Abdominal Pores and ending with Vision.

As an example of the scheme of treatment we may take the sub-section entitled Commensalism and Symbiosis. First we find the general papers listed in a separate paragraph. Next follow miscellaneous and popular accounts in which no species are named. These are followed by specific data arranged under the following headings: Algae and Fishes; Coelenterates and Fishes; Echinoderms and Fishes; Fierasfer symbiotic with Echinoderms, Pearl Oysters and Tunicates; Mollusks and Fishes; Sponge and Fishes; and finally Symbiosis among fishes. Here for instance we find references to pilot fishes and sucking fishes associating with sharks, the references being to the papers of authors listed in Volumes I, II and Addenda.

All other headings of the 118 sub-sections, are similarly treated, going always from the general to the specific. As a few examples of these headings we may note: Coloration, Deep-sea Fishes, Electrical Fishes, Flying Fishes and their Flight, Hibernation, Luminosity and Phosphorescence, Pisciculture, Pisonous Fishes, Skeleton of Fishes, Nervous System, etc.

To illustrate the difficulties in analysis and synthesis of large amounts of material such as

that found under the Nervous System it was necessary to set *Brain and Spinal Cord* off as separate sections, and then consider the remainder of the material under the general head Nervous System. The abbreviated references to this general subject cover a total of about ten closely printed pages of the subject index.

Let us select the sub-sections *Aquaria* and *Aquarium Fishes*, subjects with which the writer happens to be concerned: Seven pages of the subject index are devoted to references to these two subjects. Under the heading *Aquaria*, there appear first references to papers on small aquaria, followed by a list of general treatises on their management, with marine aquaria treated separately. Lastly we have references relative to the principal aquaria of the world, arranged under the two headings *European Aquaria* and *Aquaria of the United States*. Under these one may find reference to the public aquariums of the various cities of the British Isles, France, Germany, United States, etc. Six pages are devoted to the subject of aquarium fishes, which are listed by genera, arranged in their proper families and orders.

The test of a work of this kind, actually covering centuries of publication, is of course its Subject Index. Other groups of animals have had their literature brought together in more or less complete bibliographies, but so far as we have been able to ascertain no group of animals has had its literature so completely set forth in a bibliography as have the fishes in this case. In the field of animal bibliography this work is in a class by itself. We need no longer run over our library boxes of cards to find what a number of authors may have written about fishes inhabiting caverns, but have only to turn to the Subject Index of the *Bibliography of Fishes*, contained in one volume of convenient size, and find all titles on the subject of Cave Fishes.

The literature of science is now of enormous extent—not limited as it was when Linnaeus undertook to furnish a nomenclature for all living things. The nomenclature of today is the result of the labors of perhaps thousands of students, and there is great need of special bibliographies such as the one under consideration.

This work was begun by Dr. Bashford Dean thirty years ago and was carried forward single-handed, until 1910, when at the instance of Prof. Henry Fairfield Osborn, it was taken over by the American Museum of Natural History. Dr. Louis Hussakof assisted in the work until 1914, when the lamented Dr. C. R. Eastman became editor. He brought out volume I in 1916 and

Volume II in 1917. Consequent upon Dr. Eastman's death in 1918, Dr. E. W. Gudger became editor, and with the collaboration of Mr. A. W. Henn, has brought Volume III to successful publication.

Two men are fundamentally responsible for this important work, Dr. Dean, who conceived the plan and in the early stages of its working out, made the entries with his own pen, and who for all the years of its growth has been the motive power of the undertaking. The other man is Professor Osborn whose faith in the enterprise led him to furnish the sinews of war: the Museum funds necessary to bring the work to a successful conclusion.

It is not to be expected that a bibliography of such proportions could be free from omissions. The present reviewer begs indulgence in pointing out one, as it happens to be a production of his own: Part V, *Voyages and Expeditions which Relate to Fishes*, does not include a certain bibliography of the *Albatross*, in which are listed nearly fifty titles relating to fishes and containing descriptions of several hundred new species of deep sea fishes by Goode, Bean, Jordan, Gilbert, Gill and others. But many omissions, if such should be found, will scarcely affect the great value of this work. In this country we will turn to it as naturally as we have for twenty years turned to the *Synopsis of North American Fishes* by Jordan and Evermann.

Another Swordfish Taken on Trawl Lines.—Captain H. Haroldson has again reported, through Mr. Henry D. Whiton, a member of the Executive Committee of the Zoological Society, the capture of a swordfish on trawl lines set in deep water: "While fishing for tilefish on December 10, about sixty miles south of Block Island in seventy-five fathoms, Captain Carl Jensen of the schooner *Mosquito* found a swordfish on the trawl when hauled to the surface. The line was looped around its head and body several times, and the tilefish on the hooks near it were cut and bruised although the swordfish had taken none of them. The fish weighed 375 pounds and was sold by Caleb Haley of Fulton Market, New York."

The points of most interest connected with the taking of swordfish on tilefish trawl lines for three years in succession, are the capture of this fish in deep waters and its presence in the latitude of New York in winter. C. H. T.



U. S. GOVERNMENT MAP OF WAKE ISLAND

WAKE ISLAND—AN ATOLL

By CHAPMAN GRANT*

The photographs accompanying this article were taken by the author.

CASUAL inspection resolves Wake Island, an isolated patch of United States territory lying west of the Hawaiian group, into three islands; a second glance classifies it as an atoll. An elliptical ring of coral rises abruptly from the ocean depths, in length four miles, in width two miles, and one-half mile in average land width. The nearby, subclosed lagoon is about three miles long and half a mile wide. The ring of solid limestone forming the atoll is continuous and varies from three feet above sea level on the southeast to just below high tide on the northwest, that being the direction in which the long axis lies.

Loose coral sand has been washed and drifted onto the flat surface of the ring from fifteen to twenty feet deep, forming a main island on the southeast half, and two smaller islands for the remaining sides. The ring is exposed at two narrow channels, separating the main from the small islands, and again across the entire northwest end of the atoll.

The drifted sand, shells, coral cobbles and limestone boulders forming the islands do not conform to the rather regular outlines of the reef, but favor the inner edges to such an ex-

* Representing the Bernice P. Bishop Museum of Honolulu, Major Chapman Grant, 9th U. S. Infantry, visited Wake Island as Zoologist on the Tanager Expedition of 1923.

tent that the lagoon is filled with fine sand and mud to within a few feet of the surface over its southeast half, and the rest to within ten to twenty feet. The surface of the lagoon is always a few inches above sea level as all the outlets are across the somewhat elevated reef.

The reef is a disappointment compared with the Florida coast. The solid limestone has been grooved by the storms and ground into potholes by revolving fragments broken from the edge. Living corals, sea urchins, giant clams and more delicate forms of sessile marine life exist only in favored localities or in the shelter of blocks torn from the undermined edge of the reef by storms of great violence. Blocks in some instances fifteen feet square are strewn over the reef and even scattered over the island and into the lagoon.

We are reminded of the Florida fishes by a wealth of butterfly fish in beautiful and bizarre colors, patterns and forms; by a number of squirrel fish all similar to ours in that they



WAKE ISLAND WRASSE

A large edible fish that is easily taken by the hook or spear.



WAKE ISLAND VEGETATION

The trees grow on sand blown ridges about fifteen feet above high tide level.

were not made to be handled and that they adhere strictly to some shade of red with white or silver; by goat fishes adapted for various means of livelihood, one even taking a trolling spoon; by many beautiful parrot fish; by porcupine and swell fish; by relatives of our "blue-heads" two feet long and beautifully colored; by every conceivable pattern and color of surgeon and trigger fish. One family we miss—the groupers—represented by only a few small species. The mackerels are here in plenty and in many shapes and sizes. The food for the

mackerels is the flying fish of the open ocean. The fish-eating reef fish have schools of mullet for their staple while the highly colored surgeons, parrots and butterflies scrape algae from the rocks or pick at small marine life.

Lace-like coral thrives in the quiet lagoon, forming clumps through which a man can break his way as if wading through sage brush. For the most part, however, the lagoon has a bare, mud bottom. It is the nursery for the mullets.

The islands are covered with high brush and low trees, with but few weeds and little grass.



SEA URCHINS AND CORALS

These Wake Island urchins are bright red, and have long and very sharp spines.



HERMIT CRABS IN TURBO SHELLS

In the heat of the day, they gather under the trees, but become active at night.



PORCUPINE FISH (*DIODON*)

This Wake Island fish is fully as spiny as it appears. The teeth, fused into a bony plate in each jaw, have great crushing power for the mollusks on which it feeds.

Around the trunk of each tree there gathers a solemn caucus of turbo-shelled hermit crabs during the heat of the day. They wander out in the afternoon and spend the time keeping the island tidy until the sun drives them in again.

The shells are the size of a man's fist; the crab bright red and similar to our Florida crab. All three islands are inhabited by the hermit crabs and also by a Polynesian rat. The rat is inoffensive to campers, and the presence of colonies of ground-nesting terns would indicate that it has not the habits of our rats. Here is a problem of barriers and distribution. How did the rat, the tiny land shells, and the insects get here? They all occur on all three islands. But what is more remarkable; how did the flightless rail get to Wake? The flightless rail occurs in numbers on the main island and the northern island, but not on the southern island. The conditions are the same, the cover and the food the same. There are the same inhabitants on all the islands except the rail, which is apparently excluded from the southern islet by a channel six inches deep studded with stepping stones at low tide. How did it cross hundreds of miles of ocean? The rails of the main and northern islands are separated by a much larger channel and therefore represent independent colonies.

ITEMS OF INTEREST

Elephant Seal Herd Increasing—When the Northern Elephant Seal, long supposed to be extinct, was rediscovered on Guadalupe Island by the Albatross Expedition in 1911, the writer counted 125 animals and secured several specimens for museum purposes. The existence of the species was made known to the Mexican Government by the United States Department of State with the view to securing its protection.

It appears that the protection afforded has resulted in a decided increase in numbers. Letters received recently from Mr. A. W. Anthony of San Diego, California, who accompanied the Mexican fisheries patrol boat *Tecate* to Guadalupe Island in July, 1922, contains the gratifying assurance that the condition of the herd is even better than was supposed at that time.

Mr. Anthony was requested by the Mexican authorities to visit the island in July, 1923, and report again on the subject. He expressed the opinion that the herd then numbered about 1250 animals.

Mr. Anthony went again to Guadalupe Island in December, 1923 where the guard informed him that elephant seals had been visiting the beach immediately in front of the guard house on the east side of the island. He was informed that several had been seen at the San Benito Islands shortly before he arrived there. In a letter dated December 20, 1923, Mr. Anthony

says: "The elephant seals are evidently becoming numerous enough to extend their range, and will in time perhaps reach their former habitat among the Santa Barbara Islands." C. H. T.

Deep Water Fishing in the Great Lakes—In the National Geographic Magazine for August, 1923, the writer referred to having witnessed the taking of trout in Lake Superior at depths exceeding 500 feet. Through the kindness of Dr. Thomas Barbour of Cambridge, Mass., he has recently secured data relative to depths at which gill nets are operated regularly by commercial fishermen in all of the Great Lakes except Lake Erie. It appears from the records now at hand that gill-net fishing is carried on in depths more than twice as great as those mentioned above. Some of these gill nets are of great length. We have personally observed the lifting of a gill net over six miles in length.

The fishes taken are the siscowet (*Cristivomer siscowet*), a deep water form of the lake trout, and certain forms of the whitefish (*Coregonus*), the latter not being netted at as great depths as are the trout.

The record for greatest fishing depth comes from Lake Superior, 1050 feet. Soundings have shown that this lake has at least one depth exceeding 1100 feet, its bottom here being more than 400 feet below sea level. The Michigan Bay Fish Company reports fishing for



GREAT LAKES FISHING BOAT

The nets are reeled in over the roller by the steam winch behind it. The boxes in the bow each hold a section of netting.



GILL NET DRYING REELS

The nets are wound around these reels after use, to dry thoroughly. The tarred floats are shown attached.



GILL NETS DRYING

Newly tarred wooden floats in the foreground.



FASTENING GILL NETS TOGETHER

The 600-foot sections fastened together form a net four miles long.

Photographs made by C. H. Townsend.

whitefish in Lake Superior at depths exceeding 200 feet. Several fishing depths for siscowet are given by the Lake Superior fishermen varying from 840 to 948 feet.

The greatest fishing depth for Lake Michigan is given as 750 feet, with many others below 600 feet. In Lake Huron the gill nets are set as deep as 600 feet.

There are no records at hand for Lake Erie. Mr. Alexander Purins reports for Lake Ontario that "we find the chub or blue fin (whitefish) from 390 to 510 feet."

The bottoms of all of the Great Lakes lie below sea level, except that of Lake Erie, which is much shallower than the other lakes, its greatest depth being only 204 feet. There are records of summer bottom temperatures in Lake Superior as low as 39 degrees Fahrenheit.

We are not informed as to deep-water fishing in other North American lakes where large trouts abound. According to a recent report of the United States Bureau of Fisheries, on certain western lakes, it appears that four of them are deeper than Lake Superior: Crater Lake, Oregon, 1996 feet; Lake Tahoe, California, 1645 feet; Lake Chelan, Washington, 1500 feet, and Lake Pend Oreille, Idaho, 1230 feet. The bottom of Lake Chelan is 420 feet below sea level.

Among the deeper lakes in other parts of the world we may mention Lake Baikal, Siberia, 5500 feet [Ward and Whipple], and Lake Titicaca, Peru, 924 feet. The Dead Sea is credited with a depth of 1350 feet, its surface being 1292 feet below sea level. C. H. T.

*New Angling Books**—We are glad to see these three books of Mr. Griswold. One does not read long about tarpon, tuna, swordfish or salmon without discovering that the writer is really the practiced angler his writings indicate. He does not write like the vacation angler who merely describes his captures, but like one who knows well the ways of the fishes he has taken many times in northern and southern waters.

There are good chapters on most of the sea and river game fishes familiar to American anglers, descriptive both of their habits and the methods of taking them, with well-told personal experiences.

The author has studied the natural history of his fishes and presents his information in attractive form. These books will not only be

* Some Fish and Some Fishing. By F. Gray Griswold. 1921.

Observations on a Salmon River. F. Gray Griswold. 1923.

Fish Facts and Fancies. F. Gray Griswold, 1923.



GALAPAGOS FLIGHTLESS CORMORANT
(*PHALACROCORAX HARRISI*)

appreciated by the angler, but the naturalist will find an abundance of useful records bearing on the lengths and weights of the larger game fishes and their behavior under varying conditions.

In a letter to the writer Mr. Griswold says "I write as an amateur rod fisherman," a statement we are not disposed to accept after reading all three of the books. We have caught grayling in Arctic streams above Bering Straits; we have taken the trout-like *Haplochiton* in wild brooks flowing into the Straits of Magellan, and have had a fair share of sport with the rod between these points, but we could go a-fishing with Mr. Griswold, feeling that we could benefit by "a post-graduate course" under his direction. C. H. T.

Sea Birds Drinking Salt Water.—When the Galapagos penguin now living in the Aquarium was brought there in July, 1923, it was observed to take copious draughts of sea water.

Years ago when the writer was preparing the skin of an elephant seal on a Lower California beach, numerous gulls gathered to feed on the scraps of meat and blubber thrown to them. We noticed with surprise that after feeding some of them lit on the water and drank slowly like barnyard fowls, lifting their heads to let the briny fluid flow down their throats.

A few days later a gentleman called upon us and said that although a horse's hair as we had stated, will not turn into a snake, it will, nevertheless, when kept in water for ten days, writhe like one, the end where the root of the hair originally was, becoming thicker and head-like, and leading in the movements of the animated hair.

We have not been able to verify this observation with horse's hairs kept in water twenty days and examined from time to time during that period, our specimens failing to develop any sign of head-formation, contractility, expansion, or other action.

For the benefit of our readers who may like to be informed as to the real nature of the "horse-hair snake," we are publishing here the explanation supplied to the *Herald*:

"It is an interesting old fable that a horse's hair, weighted in a stream, will turn into a snake; but the facts are as interesting as fiction regarding the nature and origin of the slender creature resembling a horse's hair, that we commonly find in ponds, ditches, watering troughs, etc.

"The so-called horse-hair snake is in reality a worm! Scientifically classed as one of the Gordiacea, it is also called hair worm. The gordian worms derive their suggestive name from the fact that numbers of them are frequently found massed together—in a gordian knot, as it were.

"In early life, *Gordius* is parasitic in insects and other animals living in fresh water. There is some difference of opinion regarding its life history. Some think it enters no other host after leaving the aquatic insect, but others are equally certain that it has several hosts and several metamorphoses before becoming a free-swimming adult.

"According to von Linstow, who made some observations on *Gordius*, the creature first becomes parasitic in the alder-fly, boring its way into the fly's body by means of a sharp proboscis with which it is provided at birth or shortly thereafter, and coming to rest in the muscles or fat of the body of its host. It remains in this fly during the fly's larval, pupal and feeding stages. The fly, browsing among the plants that grow by the water's edge, is swallowed by a predaceous beetle, and *Gordius* remains in the beetle's body over the winter (i.e., this is its second winter as an internal parasite) and eighteen or twenty months after it hatched from the egg, it

returns to the water, an adult. If von Linstow's observations are correct—and they probably are—it seems that the worm cannot reach maturity unless it is lucky enough to find those two hosts in proper succession. This is thought to account for the great number of eggs that the adult *Gordius* lays—a common phenomenon among animals in which few of the offspring are destined to reach maturity.

"Later observations seem to show that *Gordius* may be also parasitic in the grasshopper.

"It is thought that the adult stage is merely a reproductive one and that the worm takes no food in this free-swimming stage, which may last some weeks or months notwithstanding.

"The males are darker, shorter, and much more numerous than the females. They have a forked tail, whereas the female's tail is pointed. *Gordius* is found in brooks, ponds, lakes and other bodies of fresh water, small and large.

"But neither *Gordius* nor a horse's hair can turn into a snake, any more than a man can turn into a wolf." I. M. M.



A NEWSPAPER-LITTERED LAWN
Summertime View in Battery Park

FRESH-WATER JELLYFISHES

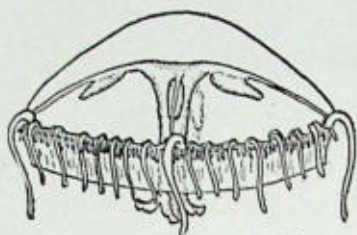
By CAPT. THOS. I. MILLER

Of the New York Microscopical Society

(Discovered in England in 1880 and since then in the United States, Africa, China, India, Egypt, and Trinidad; but their life history is not yet known.)

IF you were about to visit the Bronx Park Greenhouses and a friend should ask you to look into the lily-tanks for jellyfish, you might be somewhat startled, unless, indeed, you were a student of the Coelenterata.

Yet such a request would be quite permissible,



FRESH-WATER MEDUSA SWIMMING
(*CRASPEDACUSTA SOWERBII*). After Hargitt.

for in just such a place were the first fresh-water jellyfish observed.

The full story is a most interesting one. It teems with scientific rivalry, mystery and long, patient observation. It is in our own country that much of this work has been done.

As to its discovery—on Thursday, June 10, 1880, Mr. Sowerby, the Secretary of the Botanical Society of London, observed in the *Victoria regia* water-lily house in Regent's Park, London, the first fresh-water jellyfish known to science.

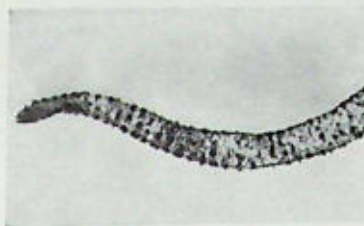
Intense interest was at once shown in the discovery. Mr. Sowerby gave specimens to several well-known zoologists, and as might have been expected, keen rivalry developed at once in those lucky enough to get them.

All were anxious to be first in describing and naming the medusa. It remained for Mr. E. Ray Lankester to take first honors in the competition, and in *Nature*, June 17, 1880, he described the medusa and named it *Craspedacusta sowerbii*.

In the same number of *Nature*, Lankester says: "I confess to having worked at the medusa day and night when I first obtained it, with the object of having the pleasure and honor of being the first to expound its structure to my brother naturalists."

In *Nature* a week afterwards (June 24, 1880) Mr. George J. Allman described and named the same medusa *Limnocodium victoria*. And so it came that in scientific literature both names were used for many years. In a generous spirit, Mr. Lankester adopted the name *Limnocodium sowerbii* and wrote many articles using that name. It remained for Alfred G. Mayor to end this confusion by submitting the question of name to the International Commission on Zoological Nomenclature, who gave the following decision: *Craspedacusta sowerbii*, Lankester, June 17, 1880, has clear priority over *Limnocodium victoria*, Allman.

Briefly described, the medusa was about one-



TENTACLE OF MEDUSA MUCH ENLARGED
(*C. SOWERBII*). After Hargitt.

half inch in diameter, bell-shaped, and with four radial canals upon which the sac-like gonads were developed. The color was a faint bluish tint. Four long, twenty-eight shorter, and 192 still shorter tentacles were present. This medusa belongs to the order Trachomedusæ.

Only male specimens were found, and these were in various stages of maturity, some quite young, others sexually mature, with gonads bursting with spermatozoa. This remarkable fact led to a search for the hydroid or eggs of the species.

The medusæ occurred in great abundance in perfectly fresh water at a temperature of 90 degrees Fahrenheit. They were seen to feed on *Daphnia* and a small rotifer.

When the tanks were cleaned out in the fall of each year, a quantity of the mud and debris from the bottom was sent to Mr. Lankester. Each year a most searching examination of this material was made, but it was not until the winter of 1884 that Dr. A. G. Bourne, an assistant to Mr. Lankester, found a very strange diminutive polyp adhering in numbers to the root filaments of *Pontederia*. It was not more than one-eighth of an inch long. This was thought to be the hydroid stage of the jellyfish.

That this was true, was later proved by Dr. G. H. Fowler, who in May 1888 showed that the little jellyfish found floating in the tank are nipped off by a process of transverse fission from the free ends of the hydroid.

The immediate question then became, How do the hydroids originate? The hydroids account for the medusæ, but whence do they themselves originate?

This question, after thirty-six years, still remains unanswered.

In 1878, specimens of a remarkable water plant *Pontederia* had been brought from Brazil by a lady, presented to the Botanical Society, and placed in the *Victoria regia* tank. There is reason to believe that in this way the medusæ were introduced into London.

In Regent's Park the medusæ were carefully observed from 1880 to 1893, and were found to reappear each spring, with few exceptions. They suddenly appeared as early as April or as late as August and remained from five to twelve weeks, when they died down and absolutely disappeared. At first appearance the young were only one-thirtieth of an inch in diameter, but slowly developed to full size.

Perhaps the most singular discovery of a fresh-water jellyfish was that made by the well-known zoologist, Edward Potts of Media, Pennsylvania. In the latter part of January, 1885, while examining under the microscope the surface of some small stones collected in Tacony Creek and vicinity, near Philadelphia, he discovered a primitive, fresh-water hydroid, since known as *Microhydra ryderi*, Potts.

He was searching at the time for the winter condition of a newly discovered bryozoan, *Paludicella erecta*, which grew upon the stones.

The hydroid as seen, was about one-half a millimeter in length, by one-tenth of a millimeter in thickness. It was sometimes simple, but in other instances divided into two nearly equal branches. It had no tentacles or cilia, and its minute size is noteworthy. Dr. John A. Ryder of the University of Pennsylvania was given specimens and was enthusiastic over its discovery. For many years he carefully observed and sketched it. Two modes of reproduction were noted: One was forming asexual larvae non-ciliated and inert. These, when detached, rested wherever they chanced to fall. The other mode of reproduction, or of propagation, was by branching.

Whether the medusæ are commonly and normally developed and their eggs hatch into hydroid polyps, or whether nature here provides more abundantly asexual method of reproduction still remains a problem.

For twelve years the hydroid polyp was watched but no medusæ were seen. Finally one day in August, 1907, Mr. Potts, while looking at the hydroids, saw a medusa released by budding and swim away free.

The thrill of such a moment may well be imagined. His only regret was that Dr. Ryder, for whom the species was named, should have died before the discovery was made.

All this work was done in household aquaria, and the medusa was never found in its natural environment.

The medusæ are about .3 mm. high and .4 mm. wide at birth.

In 1893 from Lakes Tanganyika, Victoria Nyanza, and the Niger, Central Africa, a medusa known as *Limnocnida tanganyicae* was described by Gunther. It had four to six simple radial canals, and numerous simple, hollow tentacles which projected from the sides of the ex-umbrella above the bell margin, with gonads diffusely developed in the ectoderm of the stomach wall. The sexual development remained unknown.

In the Yang-tse-kiang River, China, a thousand miles from its mouth, was discovered a jellyfish known as *Craspedacusta kawai*. It is closely allied to *C. sowerbii*. The medusa is bell-shaped and 20 mm. wide, and displays more than 356 tentacles in seven different orders of size. It has four radial canals. The medusa may have been introduced into the river through the well-known religious interest of the Chinese in the cultivation of water-lilies.

In May, 1911, S. P. Agharkar collected in Western India a fresh-water jellyfish which has been named *Limnocnida indica*. The exact locality was the Yenna River, a tributary of the Krishna, about 2,200 feet above sea level. It was found later in the Koyna River nearby, and in a pool near Medha. The river here runs through a number of pools connected by shallow channels among the rocks. In the midst of one of the rocky portions of its bed, there is a pool of exceptional depth with rocks rising vertically out of it on both sides, and it was there that the jellyfish were found. The total depth of the pool may have been fifteen or twenty feet. In this pool were medusæ of all sizes and both sexes but no asexual generation was observed. The medusæ varied from 1.75 mm. to 15 mm. in diameter, and the number of their tentacles was 384.

Determined efforts were made to discover the supposed hydroid stage. Stones were placed at different depths below the surface of the water in the pool, and left undisturbed for three, four and six months. The place was watched continuously by a peon engaged for the purpose. The locality was visited and the stones examined, as stated, but at no time were any organisms seen which could be the hydroid stage of *L. indica*.

At one time a number of medusæ were placed in a wide-mouthed jar and immersed in the water. A microscopical examination failed to reveal any eggs after immersion one or two days.

In India these jellyfish are called by the natives "water flowers."

The medusa *Moerisia lyonsi* has been described by Boulenger from the brackish lake

Qurun in Egypt, where it appears in May. Lake Qurun is in the Fayum province, and the medusa is thought to be a survivor of the fauna of the Pliocene Sea, which once covered that section.

This medusa has a globular bell, 4.5 mm. wide and about 4 mm. high. Here, again, only males were observed, although Boulenger studied 400 specimens. He found considerable variation in the number of their tentacles, which ranged from five to twenty-three, but most of them possessed four radial canals. The hydroid, occurring at a depth of from six to fifteen feet, possesses the peculiarity of hollow tentacles. It produces medusa buds and asexual, planula-like buds.

In a lagoon on a coconut plantation of Trinidad, von Kennel discovered a white and yellow medusa *Thaumantias lacustris*, the bell of which was about 2 to 2.5 mm. in diameter. There were from sixteen to twenty-four very long tentacles, and four radial canals. Although the lagoon communicates with the sea during the rainy season, its water was apparently fresh when the medusa was discovered; at least it was not salt to the taste.

Now a muddy Kentucky creek is about the last place in the world where one would expect to find jellyfish. Yet there they were found and afterwards brought to the attention of scientific men by Professor Harrison Garman of the University of Kentucky.

He states that on the morning of September 27, 1916, there was brought to him a large bottle of creek water which contained the badly decomposed bodies of jellyfish. They came from Benson Creek, about twenty-eight miles from Lexington, and were found there by Mr. C. M. Bridgemord, who asserted that "millions" of the animals were to be seen.

Professor Garman visited the place at once by way of the Kentucky River, going in a motor boat. Entering Benson Creek, the locality where the jellyfish were first seen was quickly reached. In the murky water one was first observed, a pulsating gray object a few inches below the surface. Myriads of the jellyfish were seen and many hundreds dipped from the water and placed in bottles.

Where this multitude of medusæ came from is a mystery. Mr. Bridgemord, who first saw them, has fished in the stream for many years, but never saw one until September 27.

The jellyfish appeared again in 1917, but since then have not been seen, although careful search has been made for them.

These jellyfish were about 15 mm. in diameter and had four radial canals. They were very carefully examined by Professor Garman, who considers them a form of *C. sowerbii*.

In 1922, Professor Garman reported that he had made a careful search for the hydroid stage but no trace of it could be found.

This seems to have been the best occurrence of fresh-water jellyfish ever reported, and the only time *C. sowerbii* has been found in a natural habitat.

Where next this elusive form will reappear, is mere conjecture. Students of pond life should keep their eyes open and report its occurrence immediately, so that the life history of this most interesting order may be completed.

IMPENDING EXTINCTION OF THE GALAPAGOS TORTOISES

By C. H. TOWNSEND

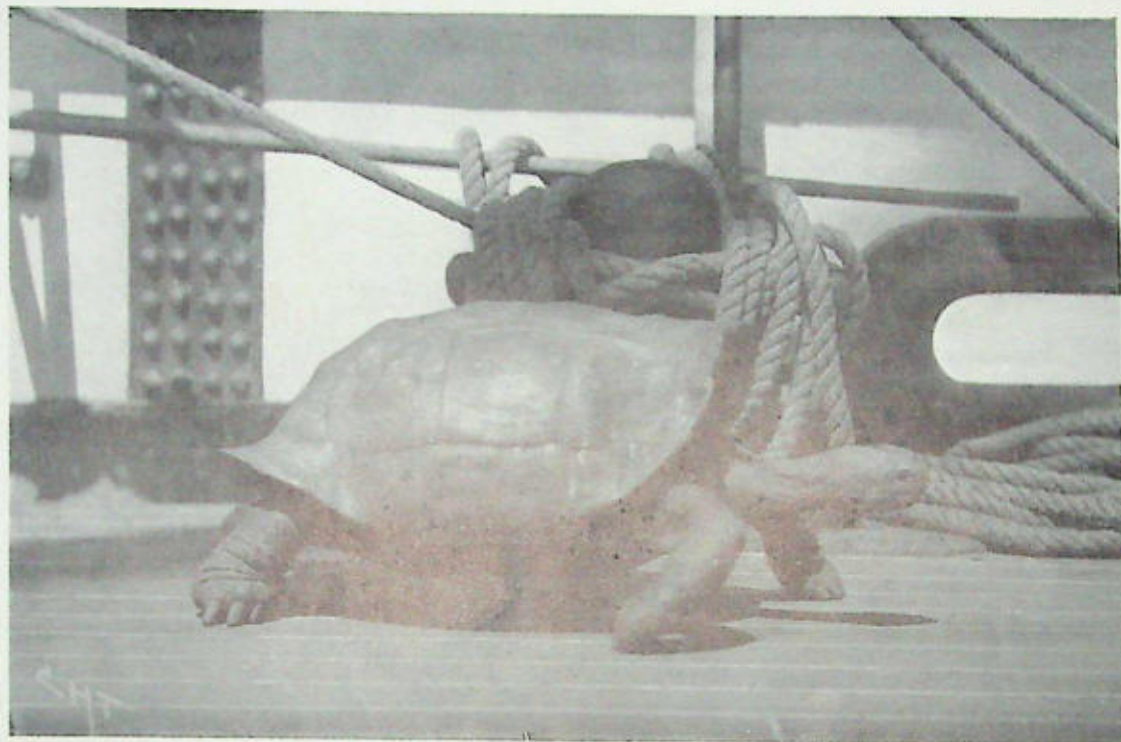
THE recent expedition to the Galapagos Islands under the direction of Mr. William Beebe, has served to re-awaken the interest of naturalists in the great tortoises inhabiting those islands, which are approaching extinction.

Although Mr. Beebe's party visited several islands of the group, only a single tortoise was found and it unfortunately did not survive the voyage to New York.

The tortoises, of which there are about fourteen distinct species, are known to have disappeared from the smaller and more accessible islands, but it is believed that they still exist in small numbers in the higher parts of Albemarle, the largest island.

The last important collection of these animals was that made in 1905 by Mr. R. H. Beck, for the California Academy of Sciences, when he secured numerous specimens, chiefly on Albemarle Island at elevations of 2,000 to 4,000 feet. Several species were represented in this collection, including those inhabiting Jarvis, Duncan, Barrington and Narborough islands. Mr. Beck's account of the very active destruction of tortoises on Albemarle for their oil, leaves little hope for the perpetuation of giant tortoises anywhere on the Galapagos. While these tortoises have lived for many years in New York Zoological Park and also in England, they do not breed in northern climates.

The important matter at present is not the collecting of more specimens for Museum purposes, but the preservation of such species as may be living. Being hardy animals, they can



A GALAPAGOS TORTOISE ON THE *ALBATROSS*
TESTUDO EPHIPIUM. Found on Duncan Island in 1891 by C. H. Townsend.
 Photograph made by C. H. Townsend.

be transported to other countries where their protection would be assured. On the writer's first visit to the Galapagos in 1888, about 20 tortoises were secured and brought to the United States without difficulty. They had the freedom of the deck of the *Albatross* and fed freely on such fruits as were available.

In 1906, Mr. M. J. Nicoll visited the Seychelles in the Indian Ocean, and described the giant tortoises now living there:

"In the grounds of Government House we saw a large number of Aldabra tortoises. Some of them were of large size and a great many were newly hatched. We were informed that they bred freely in confinement and that the young grew very quickly.

"These tortoises are used for food by the natives and on visiting the market we saw several tethered by the leg and exposed for sale. On all the islands and inhabited islets of this group, there were tortoise farms. In nearly all these farms the tortoises bear a number which is painted in white on the shell. Many farm-owners keep a record of all their stock, while at Government House a complete

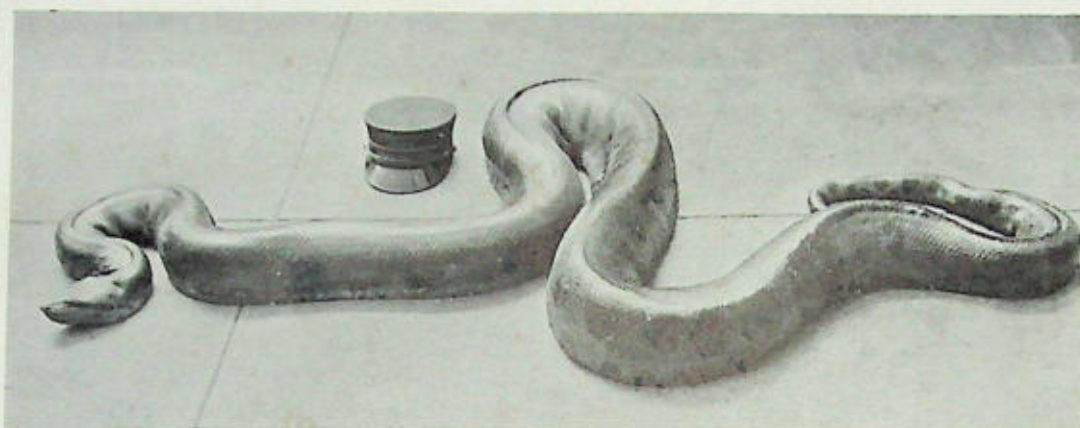
register is made with the dates of hatching and and so forth. At the latter place we rode upon the largest tortoise.

"All these tortoises have been imported from Aldabra."

This island and the Seychelles lie north of Madagascar. On Aldabra the giant tortoises are increasing under government protection. There is little doubt that the giant tortoises of the Galapagos would live and breed if transported to the Hawaiian Islands, the islands of southern California, the Virgin Islands, Porto Rico, or to any suitable climate where absolute protection could be afforded them.

If an attempt should be made to save one or more of the species of giant tortoise from extinction, there should be no delay. The motive for such action need not be on the basis of sentiment. The giant tortoise has a high edible value, and is being conserved on islands in the Indian Ocean for that reason. Several generations of whalers feasted upon the Galapagos tortoise.

It should be preserved as a valuable food animal, especially adapted to arid regions.



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MRS. MARGARET OLIVIA SAGE

Benefactor of Science, Art, Literature, Education and the Cause of Human Welfare

ZOOLOGICAL SOCIETY BULLETIN

Published by the New York Zoological Society

VOLUME XXVII

MAY, 1924

NUMBER 3

MRS. RUSSELL SAGE AND THE ZOOLOGICAL SOCIETY

IT is impossible for any friend of wild life who knows the zoological record of Mrs. Sage to think of her without a sensation of gratitude and affection. The promoters of zoology and wild life protection who are both able and willing to do really great things in either of those lines of human endeavor, are mighty few, and far between. This is very, very difficult to understand; but it is the decree of Fate, and we are perforce compelled to accept the handicap it imposes. If a reasonable sum of money were available in the right hands, the wild life of North America could be saved on a reasonably satisfactory basis; but the hard cash available for that purpose is a ghastly joke because of its midget smallness.

Mrs. Russell Sage lived and died in New York, and she left the world very much better than she found it. In the bestowal of her enormous wealth, in the avoidance of mistakes, and in the permanence of her various uplifts to humanity, she was the most remarkable woman of our time. Incidentally, she was the first New Yorker of great wealth who did not give millions to the already rich institutions of New York and New England, and dismiss the New York Zoological Society with a handful of remnant crumbs and husks. Her bequest, of approximately \$750,000, was the first large and worthwhile gift that the Society received during the first quarter-century of its existence.

As a significant forerunner of that splendid and sorely needed bequest, Mrs. Sage gave \$25,000 to the Permanent Wild Life Protection Fund, which was four times more than the next highest gift. Later on, it was her gift of \$56,000 that made possible the erection of the Museum building which made the National Collection of Heads and Horns available to the world.

In addition to the above Mrs. Sage is to be

credited with permanent improvements on the New York Aquarium made at a total cost of \$100,000.

In 1912 Mrs. Sage purchased Marsh Island, on the Gulf coast of Louisiana, a famous gathering place and winter feeding ground for great numbers of northern waterfowl and shore birds. The total cost of this gift to the sportsmen of America was \$160,000.

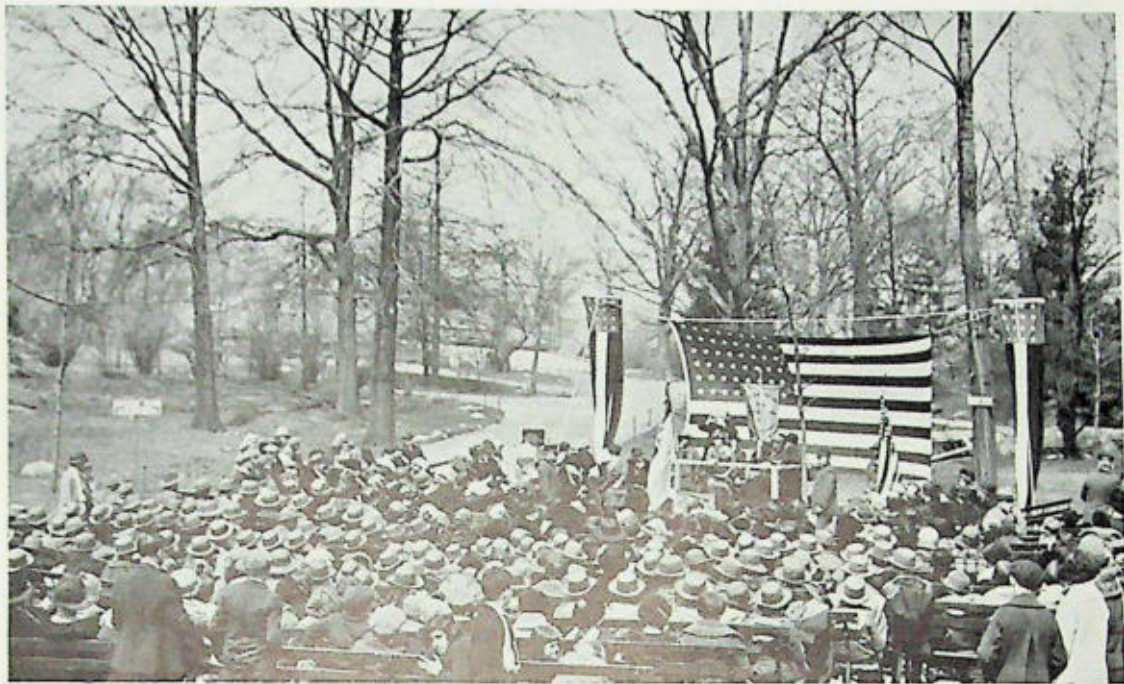
On April 5, 1924, under the leadership of Mrs. Charles C. Marshall, Chairman of its Conservation Committee, the New York City Federation of Women's Clubs performed in the Zoological Park a ceremony that did honor to the cherished memory of Mrs. Margaret Olivia Sage, and also to the Federation.

With solemn and appropriate ceremonies a lusty young oak tree was planted at the Bear Dens, as a memorial to Mrs. Sage. After a cornet solo rendering of "Auld Lang Syne," and an appropriate prefatory address by Mrs. Thomas Slack, President of the City Federation, Dr. William T. Hornaday delivered a eulogy of Mrs. Sage. The tree was planted by Mrs. Charles C. Marshall and Mrs. Slack, after which Mrs. Marshall recited a poem by Margaret E. Sangster, entitled "Park Trees," and the cornet soloist rendered "America" as the closing number.

IN MEMORY OF MARGARET OLIVIA SAGE

An Address Delivered by William T. Hornaday, at the Planting of a Memorial Oak in the Zoological Park, on April 5, 1924.

In this period of hectic haste, and swift change from day to day and hour to hour, the American people seem to have acquired the habit of forgetfulness. Often the hero of today is the forgotten fossil of to-morrow! The ingrowing habit of concentration on self is becoming a national trait.



CEREMONY PRECEDING THE TREE PLANTING

Members of the New York City Federation of Women's Clubs, Officers of the Society, Girl Scouts and guests assembled at the ceremony of the planting of the oak tree dedicated to Mrs. Sage

Half a century ago the names and memories of our illustrious dead were prized as inheritances, and cherished as sacred possessions. Then, monuments were quickly erected. Today, it is only the super-hero whose memory is kept green for a year and a day. Men and women now toil long and sacrifice much for the welfare and uplift of humanity, and at the last leave their fortunes to institutions and causes,—only to receive one obituary tribute, and then be forgotten.

Particularly is it the way of the young to forget quickly those who have given to them and disappeared. As a people, we Americans now neglect our illustrious dead, and all too quickly turn from them to the living possibilities.

Today, we gather here in a spirit of sincere remembrance, to do honor in our modest way to a great soul who lived, and wrought for our benefit, and passed away. Let us tell it to our children, and to their children, with feelings of thankfulness and pride, that it was our good fortune to live in the time of Margaret Olivia Sage, of New York and America! In like manner can we say with pardonable pride that we were contemporaries of Theodore Roosevelt and Andrew Carnegie; and a few of us may even add the illustrious name of Abraham Lincoln.

Mr. Russell Sage lived and hunted big game in the always dangerous financial jungles of New York. He loved the excitement of the chase that has furnished many great men with sport quite as exciting as the pursuit of tigers and elephants in the jungles of India. It would appear that Mr. Sage cared little for wealth beyond the excitement incident to its pursuit. Having won his game, he had neither strength nor inclination for the devising of schemes for its expenditure. For fame, and for the applause of the multitude, he cared nothing. At the close of his life, with profound faith in the wisdom and judgment of his wife, Margaret Olivia Sage, he placed in her hands, unreservedly, and subject to the dictates of her single will, his entire colossal fortune.

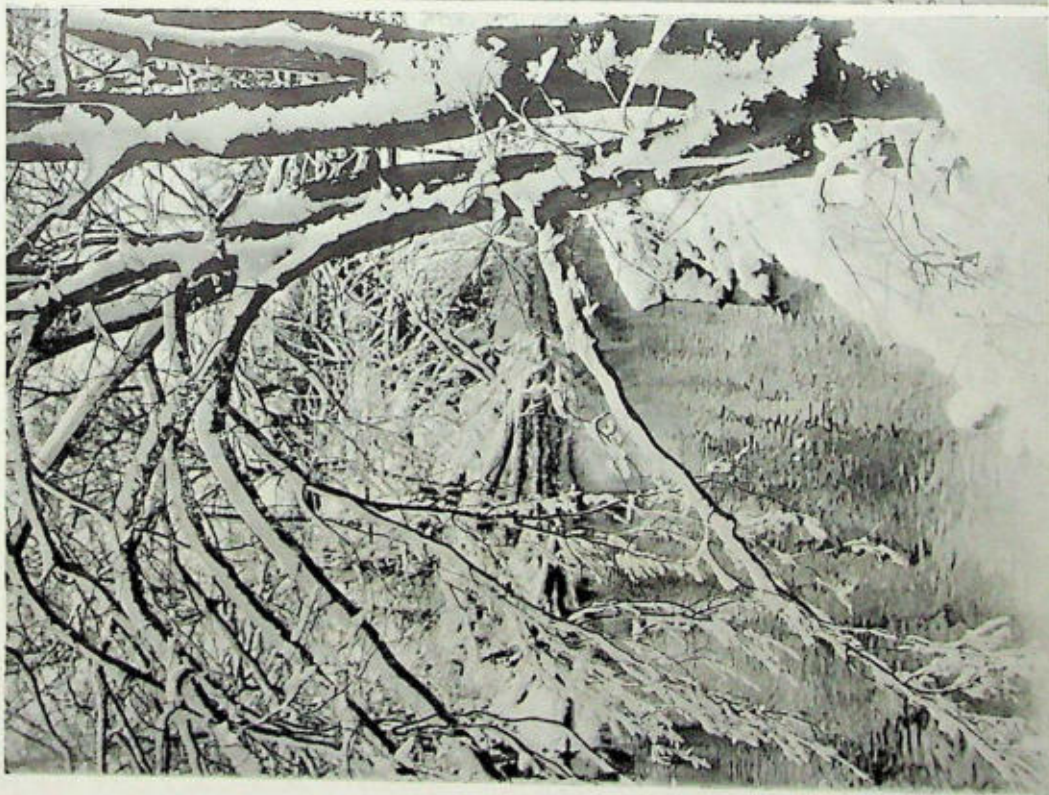
And then the question arose, "What will she do with it?"

Mrs. Sage's opportunities for extravagance and error were boundless. All too often under such conditions the weak mind is dazzled, dumbfounded and upset. Often a weak will becomes the prey of human vultures of many kinds. Often the sudden accession of enormous wealth plunges its new and inexperienced possessor into wild extravagances. On the other hand, such circumstances cause some individuals



PLANTING THE MARGARET OLIVIA SAGE MEMORIAL OAK

Mrs. Thomas Slack and Mrs. Charles Cyrus Marshall casting the first shovelfuls of earth around the roots of the tree.
Photograph by Elwin R. Sanborn



"NO CLOUD ABOVE, NO EARTH BELOW,—A UNIVERSE OF SKY AND SNOW!"

Nature forestalled the practical jokers of April first and literally plastered the whole country around with a very huge joke, in the form of a snow storm that most effectually stalled the wheels of progress. It was a fitting climax to a somewhat snowless winter.

Photograph by Elwin R. Sanborn

to rise to great heights in the exercise of new power.

Great was the occasion that was thrust upon Mrs. Sage, and grandly did she rise to it. She devoted all the remaining years of her life to the study of institutions, men and women, and the devising of new ways and means for the bestowal of substantial and permanent benefits upon mankind. With penetrating vision and keen discrimination, she selected the objects and causes most worthy of aid and uplift, and gave to them liberally.

Her broad love for humanity led straight to the creation of the Russell Sage Foundation, and its great and permanent work for the betterment of humanity in the mass.

Fortunately for the cause of zoological education, Mrs. Sage chose to aid in the promotion of zoology for the millions, and in the practical business of protecting and maintaining the birds and mammals of the world. This led to the purchase of a great domain of land and water in the winter home of the wildfowl of North America, on the coast of Louisiana, and now known as the Sage Bird Sanctuary. It also led Mrs. Sage to become the most liberal founder of the Permanent Wild Life Protection Fund.

The grand climax of the work of Mrs. Sage came at the close of her long and useful life, in the terms of her last will and testament. Never since America became a nation has the world witnessed another bequest of wealth so wise, so broad, so generous or so far-reaching as then took place. Scores of institutions were embraced in a systematic scheme of benefactions, grouped under the general heads of literature, science, art, education and human welfare; and each one of them received, not thousands merely, but hundreds of thousands of dollars. On this brief occasion there is not even time to name them. The breadth, the scope, the intelligence and the warmly-pulsing humanity displayed in that effort was more than grand. It was magnificent.

Today, Ladies of the New York City Federation, you have assembled here to register your love and admiration for one of the greatest of all American women. Although you can erect no stately pile of marble, or ornamental bronze, it is your desire to raise a memorial tribute that may endure for at least a century. Here you have decided to plant a lusty young specimen of North America's grandest forest tree, the white Oak, and dedicate it to the memory of Margaret Olivia Sage.

And truly, this monument will speedily grow worthy of its high object. In the coming years it will assume grand proportions, and qualities of beauty.

In the first flush of springtime its opening leaves will bring a promise of good cheer to follow. In summer its great crown of green leaves will give grateful shade and shelter to birds and men, and remind all women to keep ever green the memory of Mrs. Sage. In the frosty days of autumn these leaves will turn to shining purple bronze, the color of earth's most enduring monuments.

Here and now will you plant your Margaret Olivia Sage Memorial Oak; and may your good wishes speed its growth and longevity. And here, as the years go by, may you bring your children, and their children, tell them your story of this tree and bid them cherish throughout their lives the illustrious memory of the world's foremost woman philanthropist,

MARGARET OLIVIA SAGE.

MR. BEEBE'S GALAPAGOS BOOK*

As reviewed in the *New York Times* by
NICHOLAS ROOSEVELT

THE Galapagos are almost unique in many respects—Will Beebe well calls them "World's End," just as in the old days they were known as "The Enchanted Isles"—for they are island deserts as well as desert islands, and on them survive types of life unknown or extinct elsewhere. These are no isles of palms and coral beaches, with cow-eyed maidens wearing shell necklaces and straw skirts. Nor are they "sprinkled isles, lily on lily that o'erlace the sea," such as inspired Senator Lodge at the Washington Arms Conference in 1921 to rival the rhetorical fancies of the redoubtable Captain Traprock. Rather are they volcanic peaks rising from the ocean, with rocky and inhospitable coasts. Instead of palms and cocoanuts there are all manner of cacti. Instead of flowered glades are deserts of lava and cinders. The principal inhabitants are giant lizards and turtles, penguins and sea lions. As a matter of fact, the Galapagos are among the few islands where no traces of primitive man have been found. A small penal colony was planted on one of the islands many years ago by the Government of Ecuador (to which

GALAPAGOS: WORLD'S END. *By William Beebe. With 24 colored illustrations by Isabel Cooper and 83 photographs, mostly by John Tee-Van. 442 pp. New York: G. P. Putnam's Sons.*



"ONE TOUCH OF NATURE"

Mr. Beebe is a man of parts which so impressed Ralph Barton that he increased his versatile gifts by this trifling feat of palmistry

the group belongs), and a sugar plantation exists on another. Until the nineteenth century, however, the only human inhabitants were occasional castaways. Today the unsettled islands are still untouched and, except for expeditions such as those of Darwin, Agassiz and Beebe, still unknown.

The Galapagos, as a matter of fact, are in many ways a naturalist's paradise. It is only necessary to read Mr. Beebe's book to understand this. He speaks of "the soul-satisfying inclusiveness" of desert island natural history, where different species are conveniently gathered almost within sight of each other, and—most striking thing of all—where fear of man is unknown:

"Throughout the whole of my visit there was continually impressed upon me the value of psychological as well as physical characters. I believe we could plot the birds of the Galapagos in two groups—those which fled at sight, or allowed no near approach, and those which approached of their own accord and called us friends. Thus we would have a fairly accurate delimitation of the seasonal migrants plus comparatively recent arrivals which had not appre-

ciatively altered in form or mentality, and, on the other hand, the birds which probably harked back not only to the unification of the Galapagos but to its junction with Central America."

Not birds alone were fearless, but also the rest of the native animal inhabitants. Sea lions proved surprisingly friendly. As Mr. Beebe was working in a salt-water pool at the sea's edge, endeavoring to pry a mollusc loose: "suddenly I got a tremendous shock as I felt a soft, warm, rubberlike substance press against my hands. I leaped back, and at that instant a baby seal rose directly in front of me, treading water with his hind flippers while his front mittened fingers were folded funnily across his breast. He looked at me with all his soul and forthwith broke into a loud, raucous wail. A deep roar sounded from the other side of a barrier of huge boulders, and instantly there appeared, swimming swiftly and banking sharply on the turn, a mother sea lion and two more infants. She saw me at once, and her fear died so instantly that it was not wholly complimentary. She might have explained it, 'That thing, whatever it is, is not a shark, so it's all right.'"

But even more interesting than the sea lions are the lizards:

"Within two days we realized that these islands were still in the age of reptiles, or rather of reptiles and birds; amphibians and indigenous mammals being wholly absent, and fishes above the water negligible—although sailfish and mullets leaped high, and blennies climbed out and flicked here and there upon the tide-soaked rocks.

"Giant tortoises and land iguanas (lizards) dominated the upper parts of the islands, while the jolly little *Tropidurus* lizards ran everywhere under foot. But the shores were held by the big black iguanas, who, more than any creature I have ever seen, except the hoatzin, brought the far distant past vividly into the present.

"Iguanas have been recorded as reaching fifty-three inches in length and a weight of twenty pounds. I saw several which I am sure were four feet long, but the two largest captured were thirty-five and forty-one inches, respectively, the latter weighing thirteen pounds. Young ones a foot in length weigh only a quarter of a pound."

These big sea lizards were caught at will either by hand or by lasso with a tarpon rod. It was possible to crawl up and stroke them with little trouble and no danger, for they are

not hostile. Curiously enough, even when lassoed and swung through the air they showed neither resentment nor fear. One was thus treated six times in succession and was found to be perhaps even tamer after this rough handling than before. As Mr. Beebe pointed out, such an experience would have driven any ordinary wild creature insane with fright.

"One of their most curious habits was revealed on a late afternoon when I lay flat on the sand watching the ageless surf pounding on the lava boulders. Over the jagged, tortured summits there climbed the largest iguana I saw on the islands. It was a full four feet in length—appearing forty to my lowly viewpoint. His head was clad in rugged scales, black and charred, looking like the clinker piles of the islands; along his back extended a line of long spines, as if to skin of lava he had added a semblance of cactus. He saw me and stopped, looking long and earnestly with curiosity, not fear; then with his smug lizard smile unchanging he dismissed me with an emotional feat as strange as his appearance; he twice solemnly nodded his whole massive head, he sniffed and sent a thin shower of water vapor into the air through his nostrils and clambered past me down toward the water. If only a spurt of flame had followed the smoky puff of vapor, we should have had a real, old-fashioned dragon."

There is much in this book to interest many kinds of readers. For the professional naturalist are detailed accounts of flora and animals—almost too detailed to appeal to the ordinary reader. Fishermen will find a good chapter on game fishing by Robert G. McKay, executive officer of the expedition. Those interested in island lore will find an admirable historical sketch of "Man and the Galapagos" by the party's historian, Ruth Rose, in which are set forth at length the adventures of buccaneers, privateers and castaways. And finally there is the amazing story of the New York taxicab driver who rushed up to Mr. Beebe at the dock when the expedition returned to New York and announced that he had been shipwrecked on Indefatigable Island (one of the largest of the group) seventeen years ago and had buried his pal and a sum of gold there. Incidentally, there is a chapter on hunting the water opossum in the Panama jungle at night which contains a description of Mr. Beebe's adventures in the presence of the eyes of all manner of jungle night life that ranks, for sheer vividness, with his account of the army ants in "Jungle Peace."

More than eighty admirable photographs and six colored plates of lizards, snakes, spiders and fish painted with astounding skill and perfection by Miss Isabel Cooper, add much to the excellent make-up of the book. Last, and by no means least, the outside wrapper has an admirable colored reproduction of Miss Cooper's portrait of a giant land iguana. This great descendant of the prehistoric age of reptiles is one of the most attractive inhabitants of those "enchanted isles" which Beebe has so aptly designated "World's End."

MEMBERSHIP OF THE SOCIETY

The following persons were elected members of the Society, January 16, and February 13, 1924, by the Executive Committee:

JANUARY 16, 1924

Benefactor

J. D. Rockefeller, Jr.

Life

Raymond B. Fosdick

Honorary

Col. J. C. Fauthorpe

Annual

John Heitman

Beverley R. Robinson

Miss Louise Fromm

Richard H. Swartwout

Henry W. Belknap

Prof. G. W. Hunter

Mrs. Nano E. Chapin

Mrs. H. Francis Jaekkel

E. Stuart Peck

Ludlow T. Lanman

George Palmer Putnam

Joseph B. Millet

FEBRUARY 13, 1924

Honorary Member

Lieut. Jean Delacour

Annual

Carlotta Monterey Barton

Paul F. Stillman

Fulton Cutting

E. A. Dunlop

F. Rhinelander Brown

William E. Halen

William A. Rockefeller

Mrs. Walter W. Naumburg

Ralph Barton

S. Bryce Wing

C. W. Beall

Samuel Thungiah Moses

Carl J. R. Ahrnke

Chapman Ropes

Edmund R. Terry

The following persons were elected members of the Society, March 12, 1924, by the Executive Committee:

Associate Founder—In Memoriam

Joseph Benson Marvin

Annual Members

Herman Rabenau

Rev. Edward G. Reinhard

Countess Maud Salm

Mrs. Wm. A. Slater

Miss Edith Hamilton White

J. Macy Willets

Winfield F. Works

Corresponding Member

Dr. F. Clément

Bees Obscure Lighthouse.—Swarms of bees swept offshore by the wind made their landing on the huge lamp of the southwest lighthouse off New Haven. The bees were so thick that they covered the lens area of the beacon and obscured the light that guides mariners in Long Island Sound.

—Sun, New York.

WILD LIFE PROTECTION RESOLUTIONS OF THE ZOOLOGICAL SOCIETY

The struggle between the destroyers and the protectors of wild life constitutes the world's irrepressible conflict. The downward pressure so long exerted by civilized and savage man on all forms of valuable wild life has lost none of its intensity, and it calls for continued efforts on the part of those who object to wicked and wasteful slaughter, and the extermination of species. In the United States at this moment a sense of false security has been engendered by the enactment of some very excellent laws, the effects of which are steadily being counterbalanced and defeated by the enormous annual increase in the actual number of killers of wild life, the perfection of the weapons which they employ, the diminution of food and cover necessary to the existence of the game, and the apathy of persons who are not specially interested in game exploitation.

Throughout the past twenty-five years, and especially since 1910, the Zoological Society has constantly and persistently pursued the second object for which it was created, "the protection of our native animals." In addition to this, the protective efforts of the Society have been expanded and extended throughout many foreign countries, and in some instances with excellent practical results. The following resolutions attest the active interest of the Society in the causes to which they refer.

REDUCTION OF BAG LIMITS AND OPEN SEASONS IN THE UNITED STATES

At the annual meeting of the Zoological Society, held at the Waldorf-Astoria on January 8th, with about two thousand members present, the following resolution was adopted unanimously:

Whereas, it appears that in many localities in the United States various species of upland game birds and mammals are disappearing through a variety of causes, and others are the victims of over-liberal bag limits and open seasons, thereby promoting extravagant killing, and leading toward the ultimate extinction of both game and sport, now be it

Resolved, that in order to secure immediate and general reductions in the volume of game killing, the New York Zoological Society hereby approves and recommends the enactment of state laws and changes in the Federal regulations for the enforcement of Migratory Bird Treaty, to effect reductions in the bag limits and open seasons of approximately fifty per cent, wherever such changes are necessary to reduce killing to reasonable limits.

THE GAME REFUGE-PUBLIC SHOOTING GROUNDS BILL

Upon one proposition the sportsmen of America seem to be in agreement. The feathered game of the United States needs further help from man in order to survive. All other subjects relating to game seem to be open to controversy. There is now before Congress a bill to do three things, wholly at the expense

of the men who kill game. The Anthony bill proposes to provide a lot of game sanctuaries, more federal game wardens for the enforcement of federal laws, and a considerable number of public shooting grounds for the benefit of hunters who can not afford to maintain memberships in exclusive hunting clubs.

This very worthy bill is needed by the vanishing game, and it should be passed into law with all possible despatch. Unfortunately, there seems to be no prospect that it can be acted upon by Congress at this session, but in the next session it should be passed by both houses. Concerning this measure, the Society has taken the following action:

*Resolution adopted on February 13, 1924, by
Executive Committee*

Whereas the zeal for reclamation throughout the Middle and the Far West has led, in many cases, to the unnecessary draining of large swamps and shallow lakes with the result that the drained areas have proved worthless for agriculture but the thousands of acres used formerly as feeding and breeding grounds for migratory birds have been destroyed,

And whereas a Bill has been introduced in Congress by Representative Anthony, known as the MIGRATORY-BIRD REFUGE ACT, which proposes methods to check this wasteful practice and which also proposes that a MIGRATORY-BIRD PROTECTION FUND be raised by having each hunter pay one dollar for a season's license,

And whereas this Fund is expected to reach a million dollars a year, available for the conservation of bird life,

New York Zoological Society



OBJECTS OF THE SOCIETY

☞ A PUBLIC ZOOLOGICAL PARK. ☞ A PUBLIC AQUARIUM. ☞ THE PRESERVATION OF OUR NATIVE ANIMALS. ☞ THE PROMOTION OF ZOOLOGY.

ZOOLOGICAL SOCIETY BULLETIN

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ELWIN R. SANDORF, Editor

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Departments:

<i>Mammals</i>	<i>Aquarium</i>
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<i>Birds</i>	<i>Reptiles</i>
LEW S. CRANDALL	RAYMOND L. DITMARS
WILLIAM BEEBE,	

Director of Tropical Research and Honorary Curator, Birds

Each author is responsible for the scientific accuracy and the proof reading of his contribution.

VOL. XXVII MAY, 1924 No. 3

And whereas this is one of the most important pieces of legislation directed towards the preservation of wild life which has been recently brought before Congress,

Now therefore be it resolved that the NEW YORK ZOOLOGICAL SOCIETY hereby endorses the principle of the MIGRATORY BIRD REFUGE ACT, introduced in Congress by Representative Anthony as H. R. No. 745.

A GORILLA SANCTUARY PROPOSED

The great East African Gorilla, of the Kivu Lake country, is in every sense a remarkable and zoologically valuable animal. Immediately following his trip to that region to collect a group of those gorillas for the American Museum of Natural History, Mr. Carl E. Akeley proposed the transformation of that region into a gorilla sanctuary. The idea immediately found favor with the Belgian Ambassador at Washington, Baron de Cartier. Today, it bids fair to be developed as a Belgian National Park, and surely that prospect will enlist the good wishes of all zoologists. Concerning it, the Executive Committee of the Society took the following action:

Resolution adopted by the Executive Committee at the meeting of April 9, 1924.

The Chairman reported that Carl Akeley had been advocating a Gorilla Sanctuary and large National Park in the Belgian Congo to be projected by the Government of Belgium.

Upon motion, duly seconded, it was

Resolved that the NEW YORK ZOOLOGICAL SOCIETY endorses the proposed action of the Belgian Government in setting aside a sanctuary for gorillas and other wild life in the Belgian Congo in the vicinity of Mt. Mikeno, Mt. Karisimbi and Mt. Gisoke.

CROW SHOOTING CONTEST

Resolution adopted by the Executive Committee at the meeting of April 9, 1924.

Resolved that the NEW YORK ZOOLOGICAL SOCIETY protests against the proposed "Crow Shooting Contest," advertised by the Sporting Powder Division of E. I. du Pont de Nemours Co., Inc., on the ground that such a contest would bring into the woods during the spring season a large number of irresponsible gunners and would inevitably result in the destruction of wild life other than crows.

Further resolved that the NEW YORK ZOOLOGICAL SOCIETY protests against this proposed "Crow Shooting Contest" on the ground that indiscriminate shooting of this character is highly undesirable.

THOUSAND ISLANDS FISH PRESERVE

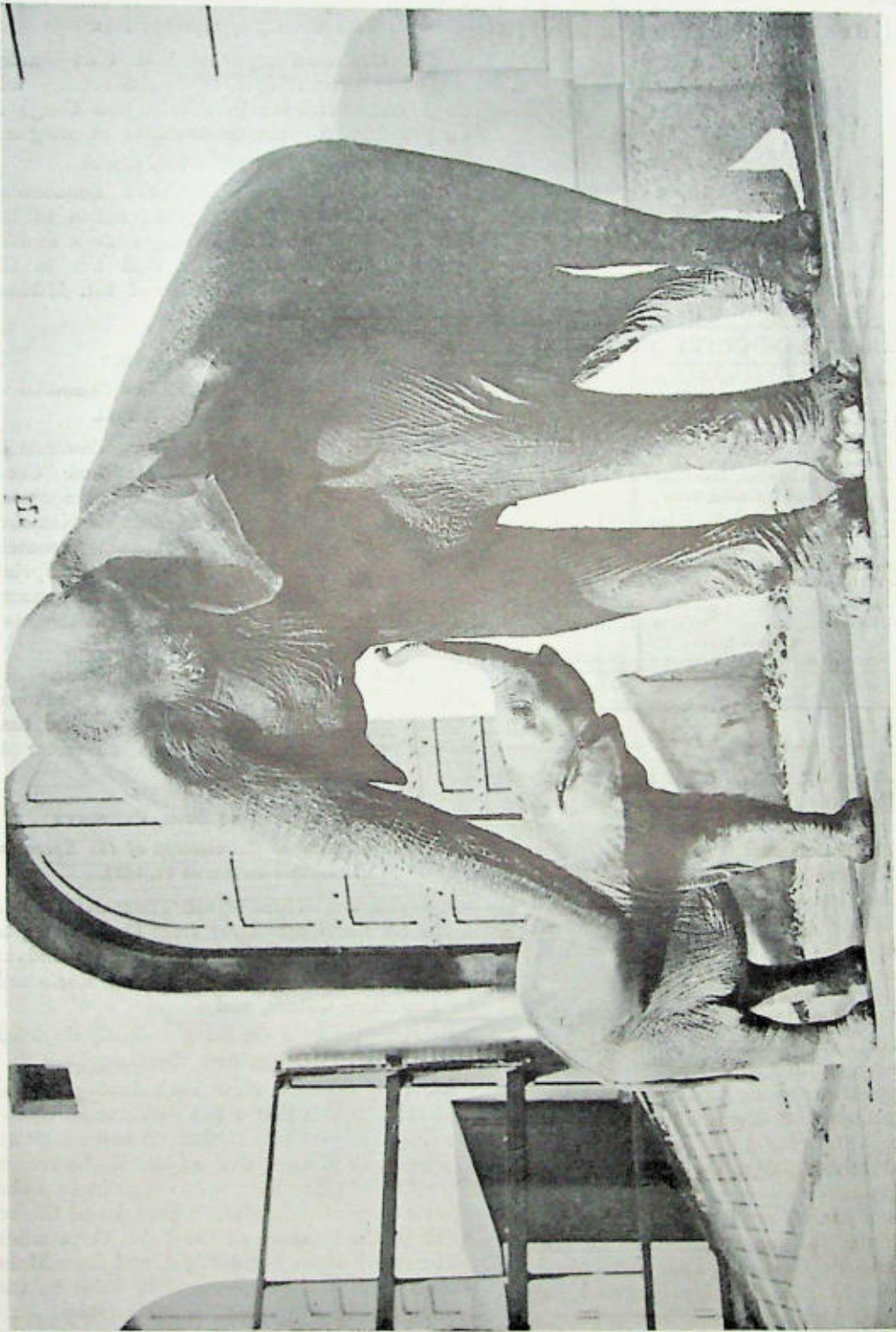
Resolution adopted at the meeting of the Executive Committee on March 12, 1924.

Whereas the region of the Thousand Islands in the St. Lawrence River from Ogdensburg to Lake Ontario is the chief breeding ground of bass and muskallunge for the Lake Ontario and St. Lawrence waters, and

Whereas the bass are being seriously depleted by commercial netting, now therefore be it

Resolved that the New York Zoological Society recommends that a fish preserve be established by the province of Ontario and the State of New York in the waters of the St. Lawrence River from Ogdensburg up to a point in Lake Ontario opposite Main Duck Island and thence to the southerly shore of the Lake, three miles southwest of Stony Point Light, and from Main Duck Island to the corresponding point on the Canadian side in the province of Ontario.

Be it further resolved that copies of this Resolution be sent to the proper authorities in Canada and in the State of New York.



AFRICAN PYGMY AND INDIAN ELEPHANT

As usual, our female Indian elephant displays the greatest affection for the pygmy, a maternal instinct that often manifests itself in our collections by the oddest of combinations. Despite the great disparity of sizes, the old elephant tempers her greatly excessive strength with a degree of skill that is admirable. The young pygmy is thriving, and increasing in weight and height.

Photograph by Elwin R. Sanborn

THE FOX MENACE AND ITS EFFECT ON OUR NATIVE ANIMALS

By A. S. LE SOUEF

WHEN the fox was brought to Australia many years ago, the only thought in the minds of its sponsors was that it would form a fine quarry for a pack of hounds, and an excuse for galloping over the sunlight plains in the good old English way. Such abstract questions as the balance of life and the possible effect of this cunning canine on our native animals were never thought of. Naturalists to-day, however, find in this immigrant and his contemporary, the ubiquitous rabbit, a problem that is unique in the world. They form an animal wave, which as far as our ground fauna is concerned, is sweeping nearly all before it, and which will only be stopped by climatic limitations.

The evolution of the various species of birds and animals of any country is very slow; some form of life is developed to fit every condition of the wild, each form having sufficient immunity against possible enemies to maintain its existence. There is a constant battle between the flesh eaters and the grass eaters, but it can be noted that, under normal conditions, a predacious animal never comes within measurable distance of killing out its food supply. A well established "law of survival" operates to maintain the balance of life. It is extraordinary to note that what appears to be the weakest forms are often the most numerous, while those that have the most highly developed natural protection are comparatively little in evidence. One wonders to find gentle deer living within range of powerful bears, fierce wolves and lithe pumas, while defenceless antelopes apparently bear a charmed life in the midst of lions, leopards, lynxes, cheetas, hyenas, hunting dogs, etc. to say nothing of eagles and pythons. Probably the first thing that strikes a traveller in any country where game is plentiful is the abundance of grass eaters, and the scarcity of their enemies. This is the more extraordinary when we consider that the carnivora have several young every year while the animals that

*Taronga Zoological Park Trust
Zoological Gardens, Mosman
Sydney*

Professor
Henry Fairfield Osborn,
New York.

My dear Professor Osborn:

Knowing your very practical interest in the world's fauna I am sending you an article on the "Effect of the Fox on our Australia animals," the importance of which only very few naturalists, even here, realize. It is, in my opinion, one of the crowning misfortunes of our wild animal world, and yet one of the most interesting phases of its history at the present time.

A. S. LE SOUEF, *Director.*

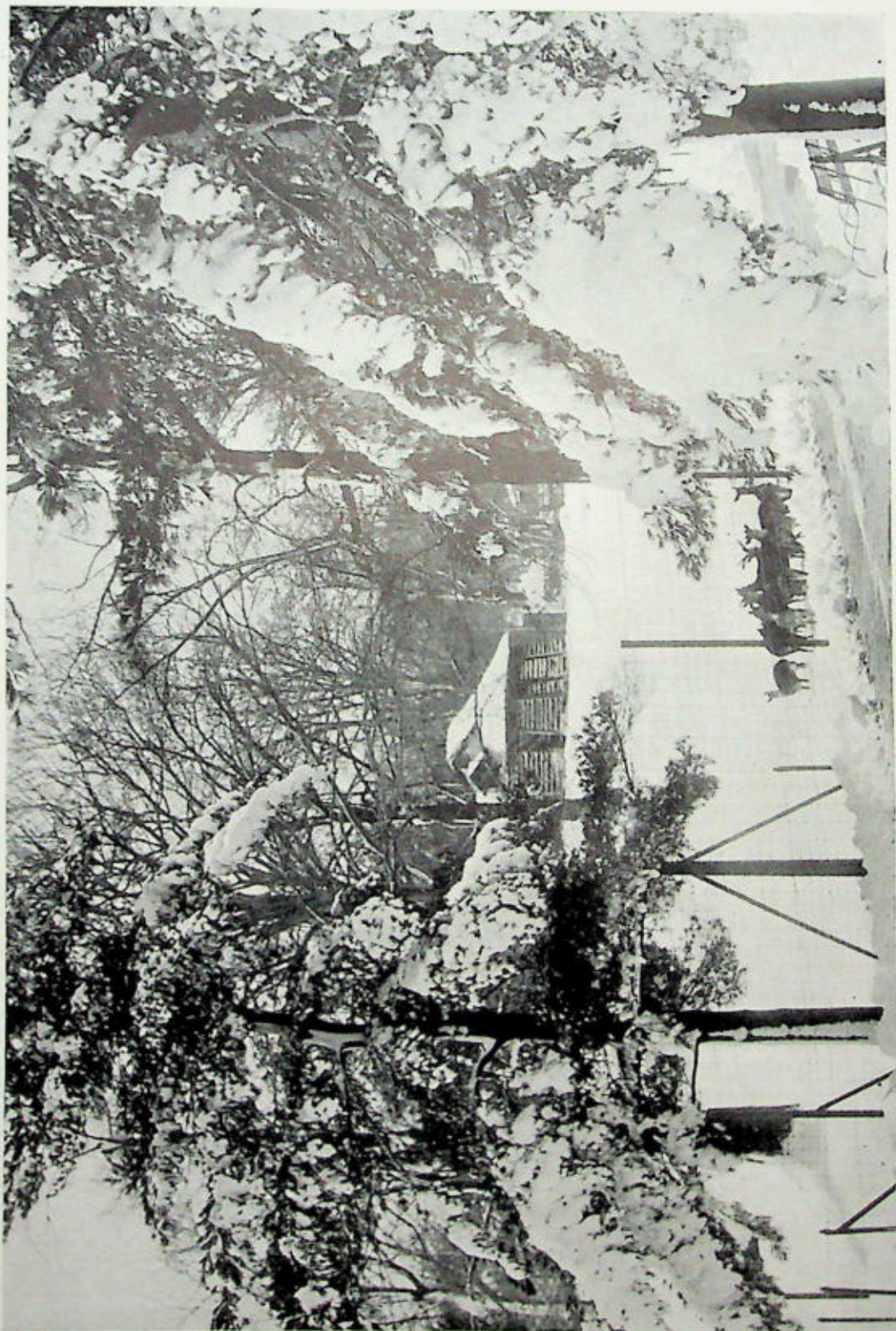
they prey upon usually have only one.

In Australia the dingo and the wedge-tailed Eagle were the principal things that kept the kangaroos, and lesser fry in check, being helped by several species of carnivorous marsupials, the goana and snakes, besides the toll taken by the aborigines. To these we have now added the fox and the cat, whilst the rabbit is a keen competitor for grass.

When we come to take stock today, we find that in the settled districts, while the fox and the rabbit are in abundance, the majority of the native animals have been dispersed. It now remains to be seen to what extent these foreigners can adapt themselves to various classes of uninhabited country, and if a balance of life will be maintained in favour of any of our ground animals and birds.

If the fox had to live on the indigenous fauna alone it is probable that these would not be reduced beyond a certain limit; the presence of the rabbit however will enable reynard to thrive apart from the marsupials. The fox and the rabbit are naturally contemporary, the latter recognises an old enemy and instinctively knows how to keep out of his way, so in practise we find that there is always a large surplus of rabbits even where foxes are numerous. Our native animals, not having developed any special protection against this new enemy, would fall an easier prey and they would in course of time be exterminated where the three types were in conjunction.

The habit of the wallabies in using certain tracks when moving from place to place would tend to localise them. Bandicoots and rat-kangaroos sleep very soundly under light surface cover, and so could easily be secured. Even the large grey kangaroos are not immune, as they lie up during the day near sheltering trees and shrubs, and this enables the fox to steal up and take the young, which at this time go scampering about in play.



THE AXIS DEER RANGE ON THE MORNING OF APRIL FIRST

The axis deer were assembled in one end of their range, apparently none the worse for the storm. One buck was quietly chewing a dead leaf which he had plucked from the brook, while his companions tranquilly "looked upon a world unknown."

Photograph by Elwin R. Sanborn

The practical disappearance of nearly all our small fauna in the fox's present domain is evidence of his activity. A striking proof of what is happening is given by Mr. C. Hoy. He learnt, when collecting in Eyres Peninsula, that foxes had been specially introduced into the district to kill the rabbits. Three years afterwards while no diminution could be noticed in this pest, the small native animals were practically exterminated. Previous to this introduction a certain kangaroo shooter could obtain six dozen wallabies per week, but in a few years not one was to be found. Proof of the danger to the larger animals comes from southern New South Wales, where two competent observers have found the remains of several young kangaroos near foxes dens, besides parts of young swamp wallabies, possums, lyre birds, pigeons, etc.

On Wotton Station, near Scone, which is a sanctuary for all wild things, under the Bird and Animal Protection Act, there are two herds of kangaroos. The manager thought it curious, that he could always find an old fox on the outskirts of these animals; moreover the fox, by imposing his presence on them, so to speak, was able to wander about without causing much disturbance. He thought at first that the reynard went there for company's sake, but when asked if the normal proportion of young ones were to be seen, he realised at once what this sinister friendship meant to the trusting roos.

Foxes have for many years been noted in the vicinity of our National Park, but as this is in the poison tick area, it is probable that they do not live there permanently. One is pleased to note that the swamp wallabies are still in evidence, and that lyre birds are numerous, though the bandicoots and rock wallabies, once so plentiful, appear to have gone.

WHAT OF THE FUTURE?

Were it not for the fox there would be little difficulty in preserving our wild animals in the many sanctuaries and districts set apart by the Government for that purpose, and they would also have the freedom of the forest reserves. This menace is, however, widespread and uncontrollable and will seemingly nullify efforts in this direction as far as 90 per cent. of our ground animals are concerned, though fortunately only two or three species of birds are likely to be affected.

We can only look to climatic and geographical barriers to limit the foxes' spread. At present the Central and Northern Districts seem to be unsuitable environments, perhaps about half the continent, while the whole of the eastern coast

is kept free by the tick that is so fatal to dogs. It is quite likely that these conditions will, in course of time, be overcome.

As previously mentioned, progress in the wild, under natural conditions comes slowly but surely, nature slowly organising to a more perfect state. In Australia we have produced artificial conditions, by superimposing highly organised animals from other countries, on our primitive fauna. As ever it is a case of the survival of the fittest, and we see before our eyes a phase of evolution passing with the rapidity of a cinema film, that would have happened aeons ago but for the Straits of Sunda.

Beaver Returns to Kansas.—The beaver is moving back into Kansas. Once very numerous in the plains country, he disappeared entirely from Kansas about twenty years ago. He shuns settlements, but nowhere in America is he safe from settlements. This busy architect of pond and stream must have come to a realization of this fact and so returned to a once favored land.

There are beaver scattered all along the Kansas-Nebraska line. There are also beaver on the Blue and a few on the Solomon and Smoky Hill. A colony migrated from Colorado a year ago and settled on the Mulberry near Ford, Kan., south of Dodge City, and there is another colony near Syracuse. A colony is reported in the neighborhood of Sterling on the Arkansas River.

They are protected by State law, it being unlawful to trap one, have either the pelt or the body in one's possession or to destroy a beaver dam or house. Four Kansans have paid fines this winter for violating the law protecting them and two other cases of reported violations are being investigated by the fish and game department, according to J. B. Doze, warden. . . . "If Kansas will conserve the stock it has now, within a few years a crop of beaver pelts worth \$50,000 or perhaps \$100,000 could be taken," says the warden. —*Topeka Capital.*

Counting the Birds.—Bird censuses will again be taken on selected areas throughout the United States this summer, under supervision of the Biological Survey of the United States Department of Agriculture. The purpose is to furnish information as to the exact number of birds nesting within the boundaries of selected tracts. Detailed instructions will be furnished on request addressed to the Biological Survey, United States Department of Agriculture, Washington, D. C.



INDIAN RHINOCEROS; YOUNG FEMALE.

Because of the great rarity of this species, the loss of our old Indian Rhinoceros was keenly felt. The young female which the Society has acquired, at a cost of \$8,000, has become thoroughly acclimated and is altogether a satisfactory exhibit.

Photograph by Elwin K. Sanborn



A SYSTEMATIC SLAUGHTER OF SURPLUS CROWS
As registered at Boise, Idaho, and evidently quite justified.

CROWS ARE STILL ALIVE

Dynamite Scheme Fails in Kansas

Pittsburgh News in Kansas City Star.

ABE ROE and three other Weir men, who recently became enthusiastic members of an organization for the protection of wild life, plan to use reverse dynamite the next time they arrange for wholesale slaughter of the despised crow. Cherokee county pays a bounty of 3 cents for every crow head. Near Weir there is a grove which is used as a rookery for crows. It is said that millions of crows obtain their lodging there nightly.

Inspired by the ideals of their organization, Roe, a grocer in private life, and his three associates decided to kill the entire flock of crows in one great massacre. All day last Sunday they worked "mining" the grove with sticks of dynamite. The sticks were tied on to tree limbs to the number of eighty-seven. Electric wires were run in a wonderful maze and a battery was put in position. After darkness had arrived the four returned to the edge of the grove to touch off the dynamite. The crows were making much noise. The switch was thrown. There was a tremendous explosion.

Bright and early the next morning Roe and his associates trucked out to the grove prepared to gather up the dead and haul the heads

to Columbus. Under the trees they found two dead crows.

Dynamite explodes downward. The crows in the tree limbs above were as safe if they had been in Arkansas.

MIGRATORY MEMBERS

IT is the intention of the mailing department of the Society to put into the hands of the Members all of the publications or any other mail matter to which they are entitled.

Very frequently, however, our best laid plans are frustrated because of the lack of proper addresses or the failure of this department to receive correct forwarding directions or changes of locality from transitory members.

We then experience the embarrassment of expressed or implied criticism for our apparent negligence, when as a matter of fact returned mail is remained often two or three times without avail.

As a mental stimulus to some of the persons who fail to receive their publications, the quotations following—from a letter issued by the U. S. Postal Service—may be productive of better results than any plea that we could make:

"Since the days of Benjamin Franklin every Postmaster General has found occasion to inveigh against a condition which has been the

bane of the postal service since its foundation; but the evil has grown as fast as the rapidly increasing business of the postal service itself, and the cost to the tax payer in round numbers amounts annually to \$1,740,000.

"It is estimated that 200,000,000 pieces of mail are yearly given 'directory service,' which means that postal employees must take time from the regular handling and dispatching of mail in the endeavor to provide correct addresses for this huge volume of misdirected matter. In New York City alone the cost of this service approximates \$500 daily.

"There is every evidence that the mailers of incompletely addressed matter believe that to the postal service nothing is impossible. The implied compliment is appreciated but it must be remembered that this no longer is the age of the town pump and that our cities have grown so that no longer can a mail distributor be expected to know 'everybody in town.'

"Mail inadequately addressed and requiring directory service, of course, means delay. Often it must be returned to the sender for a new address. For the lack of a return address nearly 20,000,000 of these are sent annually to the Dead Letter Office.

"A great public service can be rendered in reducing the enormous extent of this careless and expensive practice."

THE CASSOWARY IN CAPTIVITY

"ALTHOUGH cassowaries are rather shy and elusive birds in the wild state, when in captivity they become aggressive, and one has to be careful not to get within reach of their sharp claws, for some individuals attack with great determination. Mr. H. W. Champion, of the Government Secretary's Department, Papua, has forwarded the evidence in connection with a case, in which a large cassowary that had been reared in captivity, caused the death of two natives. The native report states: 'That when the cassowary was a little big, it went bush, but often came back to fight the village people.' So well was this trait known that orders were given for no one to go about alone. However, a man named Tauno went out to his garden and as he did not return, his mother went to look for him and found him dead, with a very big cassowary nearby. No sooner did the woman put in an appearance than she was attacked and so badly injured that she died. Careful inquiry by a magistrate left no doubt that the

two people had been killed by the bird."—The *Emu*.

This note is an excellent example of the dangerous character of powerful and aggressive creatures which have been reared in captivity and have lost their instinctive fear of man. In our own country, deer are the most frequent offenders and one often hears of murderous attacks by bucks kept as family pets. Most birds lack size, strength and weapons for effective offense but not a few are sufficiently aggressive. However, some of the ostrich-like species can qualify on all points and are antagonists that must be treated with alert respect. There are four main groups of these birds, with characteristic family tempers ranging from the mildness of kittens to the savagery of tigers. The South America rheas are harmless, inoffensive, and inclined to be timid. The Australian emus are more aggressive and will attack almost anything. However, they usually are friendly or indifferent toward their keepers, and their enclosures can be entered with impunity. The African ostriches vary somewhat amongst themselves but most males and some females are dangerous. In the Zoological Park we have found it necessary to arrange for the closing of gates from without, so that the keepers need not risk their lives in caring for their charges. But of them all, the East Indian cassowaries are by far the worst. Occasionally, one finds an individual that is docility itself. But the majority are chronically splenic and will instantly charge anything from a squirrel to a horse. If a strutting cock ostrich is struck by a pebble or a bit of wood, the source of which he is not certain of, he immediately subsides; a second or third will cause him to meekly turn tail. But nothing short of death itself will stop a fully-roused cassowary. Stones, sticks and blows mean nothing to him. Only a friendly tree or fence could prevent serious injury to the unfortunate person engaged in such an encounter and the note from far away New Guinea adequately substantiates this statement. *L. S. C.*

An Unusual War Memorial.—The announcement that the Royal Society for the Prevention of Cruelty to Animals proposes to build a \$10,000 cenotaph in Hyde Park to the memory of birds, beasts and fishes which died in the service of Great Britain during the war has been received with astonishment and criticism. It was explained that the fishes were the goldfish which were used for testing water in which gas helmets were washed before being reissued.

—*Sun*, New York.



ARRIVAL OF OUR NEW CAMELS

Reversing the general order of things, this recent acquisition was treated to the novelty of a ride in an auto truck with inflated tires; a sensation which they seemed to appreciate as a distinct advance over the old style of cushion tires provided by nature. We surmise they were satisfied with the ride; we know they are safely anchored.



ON THE DECK OF AN ARMY TRUCK

Two animals to the truck, and the long ride from New Jersey was accomplished with ease and comfort. It was a short ride compared with the long one from Australia from whence they were brought by Mr. Joseph, who is holding the right hand animal in the upper picture.

Photograph by Elwin R. Sanborn



CEDAR TREES OVERTURNED BY THE WEIGHT OF SNOW

Another phase of the joke by Nature that produced much consternation in the forestry ranks, was the devastation wrought by the storm among the more slender evergreen trees. The picture shows but a small area near the Concourse, and illustrates the seriousness of the damage done here and of a similar character in other places. In many instances the strength of the main trunk of the tree was strained to the utmost to carry the weight of snow. Often this strain was so great that the trees bent gradually to the earth, lifting out the entire root mass, and in other cases the trunk snapped off close to the ground. Trees that were uprooted could be reset without permanent injury.

Photograph by Elwin R. Sanborn

VINDICATING THE GREBES

GREBES have long been numbered among the birds suspected of endangering the supply of certain fishes valued as human food. The charges against these birds, however, have been made without foundation in fact, according to the Biological Survey of the United States Department of Agriculture. To arrive at this conclusion required careful study of the food habits of these birds, both by field observation and by microscopic examination in the laboratory of the contents of nearly 400 grebe stomachs, collected in various parts of North America. This was made possible during an extensive investigation that has been undertaken of the economic relations of fish-eating birds in general.

The results of the findings, so far as the grebes are concerned, are now published in a new bulletin of the department, prepared by Dr. Alexander Wetmore, of the Biological Survey, under the title, "Food and Economic Relations of North American Grebes." This constitutes the latest addition to the valuable series of reports intended to deal with the economic value of all groups of birds of the United States. Since 1887 formal reports have been issued on the relations to agriculture of more than 200 species of birds, besides shorter accounts of as many others.

In the new bulletin the food habits of six species of grebes are described in detail. It is found that some of these peculiar birds feed on fishes, but on the whole the kinds of fishes eaten are of little or no value to man. Crawfishes and other crustaceans are common food for grebes, and the pied-billed grebe especially is beneficial in localities where crawfishes are destructive to crops. Predacious water beetles and bugs constitute a large part of the food of several species of grebes, which also act as scavengers among the masses of miscellaneous insects found floating on the water. It is a fact of interest that all species of grebes are found to have the peculiar habit of eating quantities of their own feathers though no definite reason for this is at present known.

Before 1903 many thousands of grebes were killed for the sake of their beautiful breast feathers, but when the market for grebe skins was closed this slaughter practically ceased. With increased protection during recent years the birds have regained something of their former abundance. They are not now considered game and are protected by Federal law at all seasons.

The purpose of the new publication, Department Bulletin 1196, is to inform sportsmen, legislative committees, and others interested in the protection of birds as to the economic status of the various species of grebes. The bulletin may be obtained, while the supply lasts, by applying to the United States Department of Agriculture at Washington, D. C.

*Reindeer Meat From Alaska.**—With reindeer from Alaska, quail from the Argentine, partridge from France and grouse from Scotland in the local markets there is less cause for complaint on the part of those who are fond of the good things of the table than formerly, especially in that period immediately following the legislation forbidding the offering of American game for sale.

The sale of reindeer meat promises to grow considerably. Those who have eaten the flesh say it is the equal in flavor of venison. The carcasses come from Alaska thoroughly refrigerated. They weigh about 125 pounds each and the price, while a trifle more than is asked for prime cuts of beef, is less than would be expected, considering the expense in getting the meat to the Atlantic seaboard.

It is a thoroughly organized business, this matter of furnishing reindeer for American consumption, and the concession for the sale of the meat East of the Mississippi River is in the hands of a firm of international reputation in the trade. Under the law permission is given to kill 10 per cent. of the young steers in the enormous herds of reindeer that make their home in Alaska. Reindeer, whose economic value is not confined to their usefulness as a source of food supply, require little attention, and a single individual can care for the largest herds. They are prolific breeders and with a 10 per cent. inroad each year the herds renew themselves every three years.

Alaska, once valued for its timber and mineral supply, has uncovered a fresh and popular asset.
—*Herald*, New York.

ITEMS OF INTEREST

By RAYMOND L. DITMARS

The De Brazza Monkey:—One of the most attractive specimens that has ever been exhibited in the Monkey House is a recent arrival—the De Brazza Monkey. This species inhabits West Africa, the area of distribution including the French Congo and the Cameroons. It was first

* Zoological Society Bulletin, January, 1922.



DE BRAZZA MONKEY

Bizarre is the word most fitting the strange markings of this specimen. To this great genus,—*Cercopithecus*, has been given some diverse and extraordinary markings.

Photograph by Elwin R. Sanborn

described in 1886 by Milne-Edwards, who named it in honor of the Count De Brazza. The body is thickly clad with lustrous, olive hair. The arms are black, the legs and tail olive, although the inner portions of the former are snowy white. The head markings are particularly striking, a black band crossing the top and separating the olivaceous hue of the body from bright, chesnut-red, which covers the forehead. There is a facial effect as if the animal had dipped the snout into a flour barrel as the nose, cheeks and mouth parts are spotless white, while an extremely long, pure white beard droops from this area. In a sitting position the animal is about fifteen inches high.

A New Anaconda:—We have recently purchased a fine specimen of the South American anaconda. This reptile is slightly over fifteen feet long and weighs exactly one hundred and thirty-five pounds. It is an adult of the species and represents the average run of mature specimens of this water boa, although we have measured specimens twenty feet long and believe that the species may occasionally attain a length

of twenty-five feet. There are many allegations of gigantic anacondas—forty or even fifty feet long—but all our efforts to verify such dimensions have been without results. The writer has no doubt about the anaconda—the largest South American serpent—being much eclipsed in size by the Malayan python.

Spring Again:—With our usual impatience we are inclined to remark about the "late spring." From reconnoitering trips in collecting reptiles emerging from their hibernating quarters, the present season appeals to the writer as quite orderly and normal in its development. After several mild days closing the month of March, we were treated with a startling surprise of the weather on April First—a day much given to jesting. A severe storm, crossing the country to the south, suddenly veered up the coast, swung the wind to the northeast and to the accompaniment of gales and a dramatic fall of the barometer resulted in the heaviest snowfall of the past

season. For several hours from the beginning of the storm the precipitation was so excessive that traffic was quickly tied up and long lines of snow encrusted trolleys lay stalled along the Park boundaries. The next day's sun dawned upon a Fairyland. Owing to the mild temperature—exactly freezing point—every bush, tree, fence and wire was smothered to extreme proportions in decorative covering, but a mild day very quickly restored the landscape to normal and on the level the snow disappeared within the week. This storm was by no means record breaking as a heavier fall took place several years ago on April 7th.

Reptile House Wall-Paintings:—Our visitors have been much interested in watching the progress of renewal of the large scenic backgrounds in the Reptile House. The first series of panoramas was painted eight years ago by Mr. E. A. Costain, of the Park staff. We were seeking, at the time, to produce "atmosphere" and depth in the big cages. The paintings have endured years of moisture and brilliant light with little deterioration, but with a general renovation of



the Reptile House, it was decided to completely renew the series. Owing to pressure of work in his department, Mr. Costain was unable to handle the task. We were particularly fortunate, however, in receiving a cordial offer from Mr. Paul Hertzel, to design and execute a new series. Mr. Hertzel's animal paintings are well known. He has also produced groups and single animal subjects in bronze that have elicited detailed criticisms of much praise in the press.

During his work on a series of animal studies he has spent much time at the Park and overheard the discussion of our problems concerning the panoramas. His work in handling this really heroic job has been astonishing in the speed of attainment, charm of color and detail and sympathetic blending of widely varied florals which are indicated. Actually, the span of panoramic detail amounts to over three hundred and fifty feet in length and eight feet in height. Mr. Hertzel has shown cypress swamps, mountains, deserts, and glades in the jungle, fusing one theme into another in a way that produces the effect of smooth continuity.



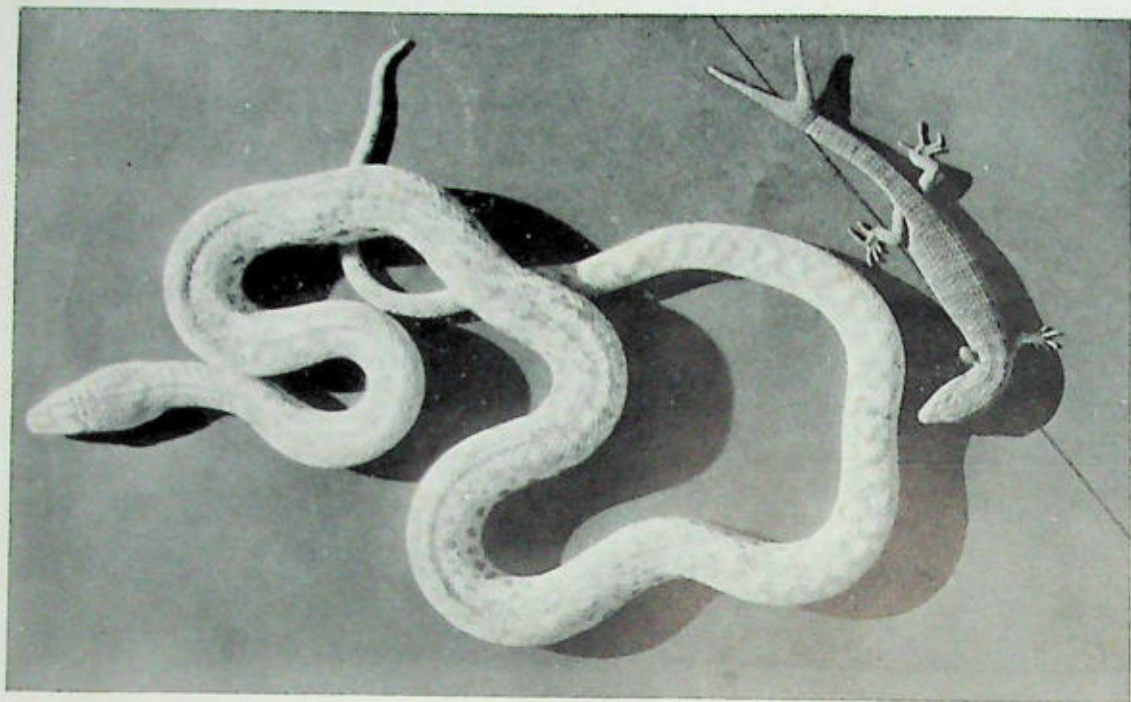
Maternal Instinct:—There was a time when Gabong, our female orang-utan was so docile that she could be taken from her cage and turned loose to romp with children—without a worry on our part. All this has changed. While Gabong is now approaching the dignity of close to a hundred pounds in weight, it is not her size that has terminated her romps outside the cage. We have had considerably larger orangs than this, which were uniformly docile. Nor is Gabong's temper undergoing a change. The trouble was produced by the introduction of two young orangs to share her cage. She immediately adopted these babies and developed such intense solicitude for their welfare that she refused to leave the cage without them. At any sudden noise in the building Gabong grabs one or both of the youngsters and hugs them to her. If the keeper makes any attempt to fondle one of the baby orangs it is snatched away by Gabong. To attempt to remove them from the cage produces a furore and as Gabong outwits all attempts to entice her from the cage, we



WEIGHING AN ANACONDA

When the Anaconda was taken out to be weighed, the chill of the morning rendered her an easy task for a single man; but as the Studio grew warm, and with it the snake, the affair became a terrific job for five men. There is no joke here; it is real acting.

Photograph by Elwin R. Sanborn



CALIFORNIAN REPTILE FREAKS

These specimens were presented to the Park by Mr. L. M. Klauber, Curator of Reptiles of the Zoological Society of San Diego. They are an albino gopher snake and a two-tailed alligator lizard—the latter indicating the power of renewing the tail after losing a portion of it, but in this instance growing a superfluous member after injury to the original appendage.

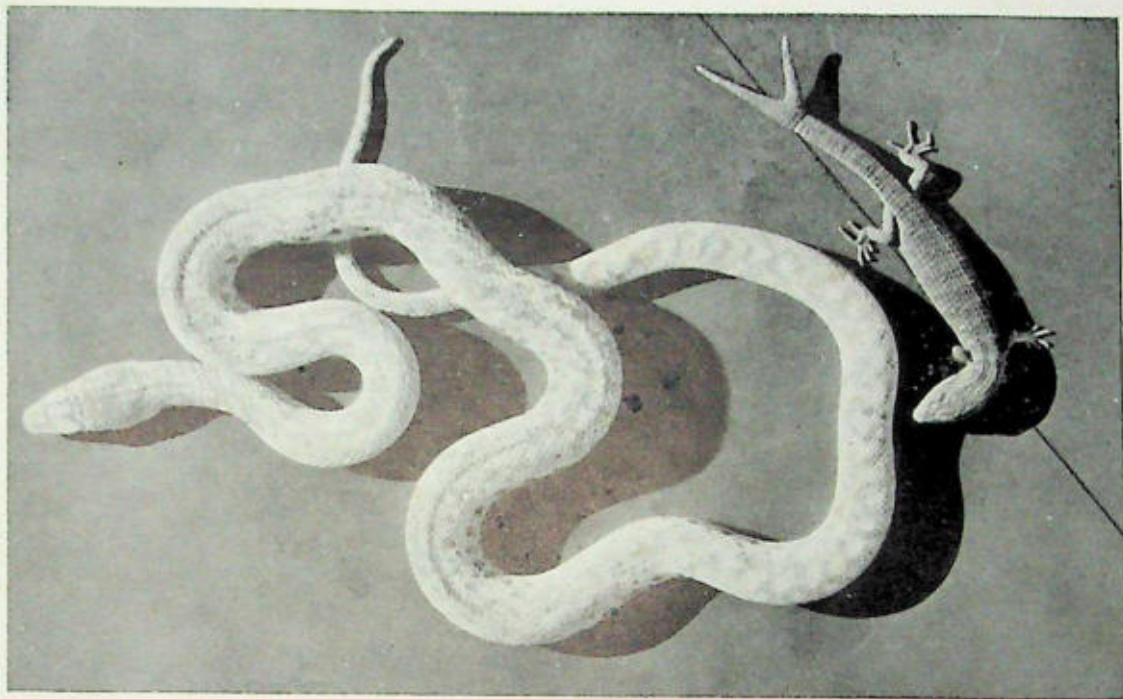
have no "tame" orang-utan to romp with the kiddies, as in former years.

Longevity of a Gibbon:—Gibbons are notoriously delicate as captives, usually succumbing within a few years to pneumonia, or gastrointestinal troubles. Occasional specimens simply pine away, lacking appetite, though tempted with varieties of food. For these reasons we refrain from ordering such animals from the dealers—in fact it has been our custom to discourage the capture of animals that will not thrive in captivity. Occasional specimens arrive unannounced and we purchase and care for them in kindly spirit. Our white-handed Gibbon was a specimen of this type and in speaking of it we are proud to think that with this animal we have broken world's records for the exhibition of the species. This Gibbon has thrived in the Primate House for eleven years and remains in perfect health and vigor.

Our Tame Woodchuck:—Living in the Small Mammal House is a really extraordinary woodchuck or ground "hog"—a species that is usually untamable. Our specimen is so docile that it may be picked up and carried around like a house cat, by anyone, and has never made an

attempt to bite. Its cage door is left open a great part of the time and the animal either follows Keeper Landsberg as he goes around his work, or prowls out of doors, looking for fresh newspaper to be utilized in bedding its sleeping box. It is astonishing to see this small animal crumple up a double page so that it may be carried, take it to the cage, then return a dozen times for more. After a generous supply has been gathered, the old paper is shoved out on the floor for the friendly keeper to carry away.

Hard-Nosed Swine:—Visitors at the south end of the Park may be surprised at times to note large areas of upheaval in the animal yards. These are surrounded by fair-sized boulders—the effect being like shell craters on a battlefield. Such disorder in the Park, where the constant endeavor for neatness is elsewhere apparent, must appear markedly incongruous. It should be explained that these upheavals are produced by our large series of wild swine and we are at a loss to know how it is possible to keep these animals contented when deprived of their curious playgrounds. All attempts to produce a happy medium have failed.



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HORSESHOE CRAB

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GALAPAGOS TORTOISE
PUFFER
MOSQUITO LARVAE
CALICO BASS

AQUARIUM FISH HATCHERY
SPIDER WEB NET
NEW GUINEA—WEB NET
CLEAR-NOSED SKATE
COL. JONATHAN WILLIAMS
BOWFIN

NEW ENTRANCE—N. Y. AQUARIUM; THE ENTRANCE CORRIDOR IS NOW SIX FEET WIDER *Cover*

ZOOLOGICAL SOCIETY BULLETIN

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LANDING OF LAFAYETTE AT CASTLE GARDEN, AUGUST 16, 1824

ZOOLOGICAL SOCIETY BULLETIN

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VOLUME XXVII

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CONSTRUCTION WORK AT THE AQUARIUM

ALTHOUGH the fund for the improvement of the Aquarium building is exhausted and the City has taken no action regarding it, the work undertaken by the Zoological Society with private funds is being continued.

As soon as the unused space in the rear of the building can be cleared, it will be occupied by new exhibits. The tanks to be constructed here will add twenty per cent. to the living collections of the Aquarium.

The old narrow entrance corridor has been widened, admitting the crowds of visitors in comfort, while also admitting air and light.

The third story constructed at the front of the building is unfinished as to plastering, wir-

ing, plumbing, and the office of the Aquarium remains in a room across the Park rented by the Zoological Society.

The accompanying pictures of the building show an unfinished exterior. The appearance of the structure should be *judged as such*. When the entire exterior has received the gray rusticated finish called for in the architect's plan, it will look very different. In the meantime the Aquarium has acquired what it never had before, namely, room for administrative purposes and increased exhibits. The aquatic life that fills the building to its full capacity, continues to attract multitudes of visitors as of yore.

—C. H. T.



THE NEW YORK AQUARIUM

View showing the new third story at the front of the building. All exterior walls to have a uniform rusticated gray finish.



MORNING IN BATTERY PARK

Photograph by Ida M. Mellen

LAFAYETTE AT CASTLE GARDEN

One Hundredth Anniversary

THE landing of General Lafayette at Castle Garden on August 16, 1824, as pictured by a contemporary artist on an old Staffordshire blue plate, is an appropriate illustration for this number of the BULLETIN, the centenary of the event being at hand.

The following account and the portrait of Lafayette are from Foster's *Tour of Lafayette in the United States*, published in 1824:

"Lafayette arrived on the ship *Cadmus*, August 15, 1824, on his first and only visit after the Revolution in which he played a conspicuous part. After transfer to the steamboat *Chancellor Livingston*, he was escorted up to the city by warships and steamboats on which were members of the city, state and federal governments. At Castle Garden, Lafayette landed upon a richly carpeted stairway arranged for the occasion, under an arch richly decorated with flags and wreaths of laurel. A magnificent ball was given in his honor at Castle Garden, which surpassed anything of the kind previously held in the city.

"It was a scene of enchantment which the mind could not bring itself to believe was a reality, and which left the beholder mute, bewildered, and gazing in astonishment. Let the reader imagine an immense amphitheatre, not less than two hundred feet in diameter, or six hundred feet in circumference, with galleries rising one above another, to the extreme part

of the battlement, the ascent to which was by lofty flights of steps—let him imagine a canopy extending over the whole area, *the apex of which was seventy feet from the floor, woven of festoons of flags of all colours and descriptions, entirely concealing the triple folds of canvas, forming the awning. . . .

"Let him imagine six thousand ladies and gentlemen, in full dresses, dancing, promenading, and moving in all directions, to the music of two numerous orchestras in the gallery, over the entrance; let him, if he can, combine, into one view, these splendid images, and he may form some idea of the *coup d'oeil* of this spectacle. . . .

"At about ten o'clock, General Lafayette entered the Castle, accompanied by his suite, and escorted by the committee of arrangements. . . .

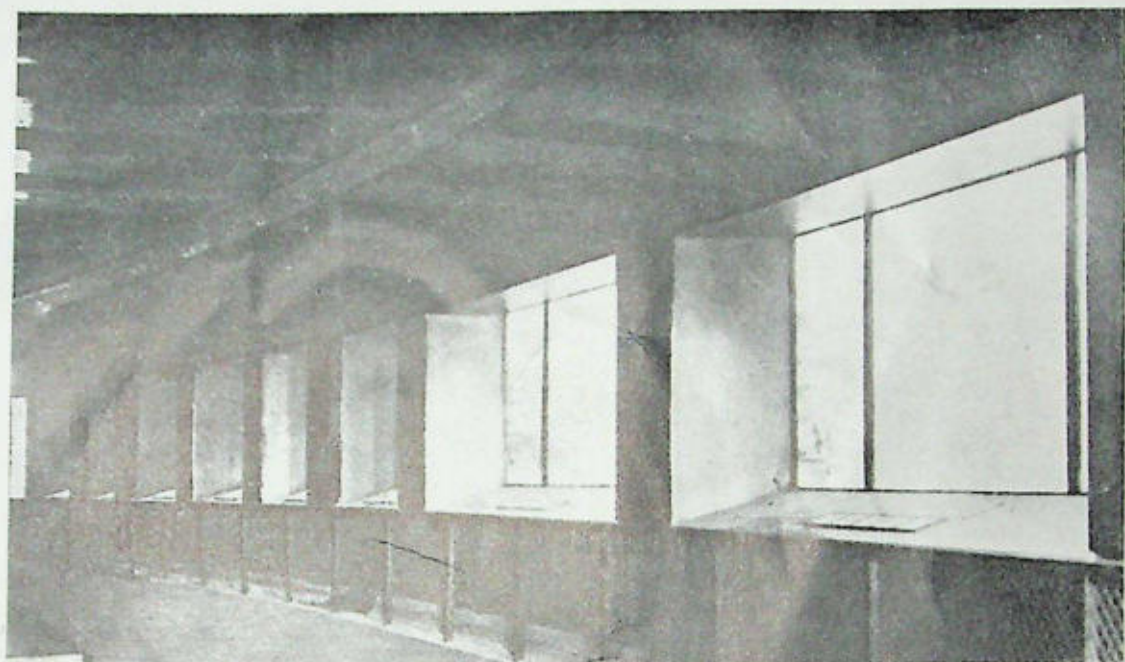
"Throughout the whole evening, the company amused themselves with cotillions, eighty sets being frequently on the floor at the same time, the dances being called, and closed by the bugle. . . .

"At two o'clock in the morning, the General took leave of the company, and embarked on board the *James Kent*, in waiting for him at the Castle, being beautifully illuminated, and adorned with banners. . . ."

(The records at hand do not show exactly on which date General Lafayette arrived at Castle Garden—August 15, or August 16.)

—C. H. T.

* There was no roof on the building at that time.



CORRIDOR IN THE LONDON AQUARIUM

THE AQUARIUM IN LONDON

THE Zoological Society of London has recently completed an aquarium in Regents Park as an addition to the exhibits of the Zoological Garden.

The accompanying illustrations are from the Guide to the Aquarium just received. In it, Dr. E. G. Boulenger, the Director of the Aquarium, says:

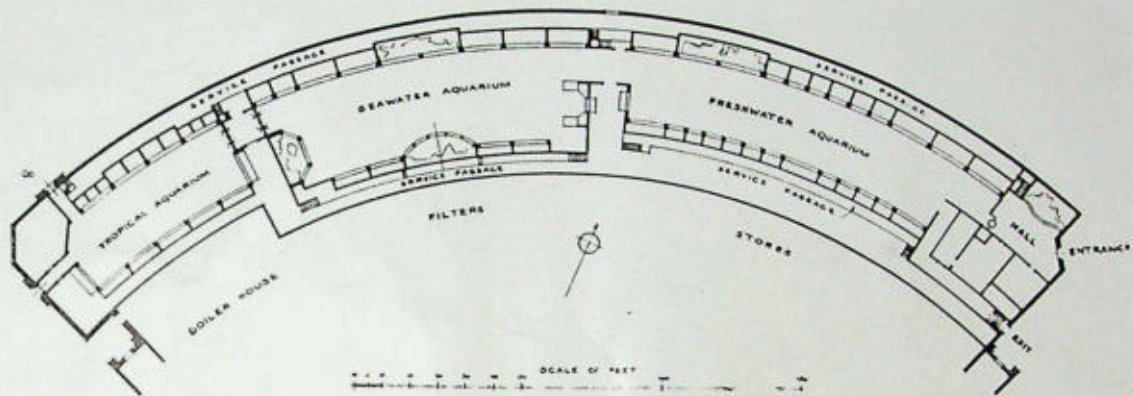
"Aquaria have not had a very fortunate history in this country. In the late 'seventies there were aquaria in London and in several of the larger provincial towns. They fell on evil days, and at the present time the Zoological Society's new institution is the only inland public aquarium of any importance. The beautiful and still popular aquaria in New York, Berlin, Amsterdam, Naples, and other continental cities are all still flourishing concerns, and show that it is possible to maintain public interest in aquatic life, provided the proper conditions for exhibiting a representative collection of both marine and fresh-water animals are maintained. . . .

"The new institution, the most up-to-date of its kind, cost nearly £55,000, and took over a year to build. . . .

"The building, which is nearly 450 feet long, is divided into three principal parts—a

fresh-water hall with twenty-five tanks, varying in size from 30 feet to 6 feet in length; a sea-water hall with a similar number of tanks, two of which are over 30 feet in length; and a tropical hall for fresh-water fish with 40 tanks, mostly of small size. . . .

"The water—both fresh and salt—is pumped from an underground reservoir, which has in the case of the sea water a 120,000 gallon capacity, in the case of the fresh water a 60,000 gallon capacity, to other smaller reservoirs situated on higher levels. From these high storage tanks the water falls by gravity into the show tanks, the overflow passing through a series of elaborate sand filters before returning to the underground reservoirs. The oxygenation of the water is also obtained by passing compressed air directly into the aquaria. The amount of sea water in the show tanks is roughly one-fifth, in the fresh water about one-third, that in the reservoirs and filters. The iron supply and drainage pipes in the marine section are lined with enamel to prevent rusting. The sea water, which will not have to be renewed for many years, has been obtained from the Bay of Biscay. . . .



PLAN OF AQUARIUM OF THE LONDON ZOOLOGICAL SOCIETY, REGENT'S PARK

"The tanks are constructed of slate or concrete, and are decorated with rockwork, arranged to suit the requirements of the inhabitants. . . . One of the most expensive materials used in the construction of the aquarium is the glass for the front of the tanks, the thickness of which is, in the case of the larger aquaria, $1\frac{1}{4}$ inches.

"A well-equipped laboratory is connected with the aquarium, where work of a zoological and economic nature is being carried out."

Among the exhibits shown in the new London Aquarium are specimens of large American fishes and salamanders presented by the New York Aquarium.

—C. H. T.

THE HORSESHOE CRAB

By IDA M. MELLETT

THE horseshoe crab, which so commonly occurs along our Atlantic coast that almost every bather is familiar with it, ranges from Nova Scotia to Yucatan. This species, *Limulus polyphemus*, is the only horseshoe crab known in the Occident, for although five species of this ancient animal still inhabit the waters of the earth, three of the other four are Asiatic and one African.

For zoological exhibitions the horseshoe crab of our Atlantic coast has been sent by the New York Aquarium to Monaco and Germany, and within the last year or so specimens were sent to San Francisco for the new Steinhart Aquarium, and to England for the new London Aquarium. A certain percentage of specimens shipped always survives the journey, for the horseshoe crab is a hardy animal. It

can survive freezing, it can endure quite warm water, and it can even live for a few days in fresh water. The eggs of the animal are also quite resistant, and those failing to hatch one summer may hatch the next.

This crab, also called king crab and horse-foot, is really not so much a crab as it is a spider, being now generally grouped among the spiders in text books of zoology. Decidedly an aristocrat among invertebrate animals, the only known animal with pure blue blood, the horseshoe crab moreover boasts an ancestry dating back ten millions of years, and has the advantage of the human race in being able to point definitely to the ancestor from which it sprang—the famous, long extinct trilobite, now found only in fossil remains.

When a horseshoe crab hatches from the almost microscopic egg which its mother deposited in the sand, it looks much more like a trilobite than like a horseshoe crab, and metamorphoses several times in moulting ere it assumes the familiar shape by which we know the adults. Taking up its abode in the mud and sand of shallow water, it subsists upon clams and worms and other small animals of the sea and shore, and if it manages to escape the gurnard and other enemies, it will in eight years be fully grown. The larger it grows, the safer it is from all foes but man, because of its uninviting shelly exterior.

Had it ever been considered desirable for the human table, the horseshoe crab would doubtless have been nearly or altogether exterminated long ago, but its inedibility and its endurance have favored its persistence throughout the ages. As a tonic and fattener



THE HORSESHOE CRAB

A form that was old before man appeared on the earth.

for poultry and pigs, American farmers hold it in as high esteem as for fertilizer—but it is said to give the hogs and poultry a "shocking" flavor.

THE CONSTRUCTION OF SMALL AQUARIA*

By IDA M. MELLE

IN the construction of small aquaria, four things must be considered—the frame, the bottom, the glass, and the cement. People have built their own aquariums to fit certain windows in the home, or to utilize some otherwise useless piece of household furniture, such as a marble-top table on which the marble has been broken, or sewing machine which is obsolete but the woodwork of which makes an excellent foundation for a home aquarium.

The framework of the aquarium, therefore, can be planned to fit the foundation or to fit the window it is desired to adorn. For aquaria

* This article will be reprinted in leaflet form, as Aquarium Information Circular No. 9.

Previous Information Circulars for free distribution are as follows:

- 1.—The New York Aquarium, Townsend.
- 2.—Care of Goldfishes, Townsend.
- 3.—Care of Turtles and Small Alligators, Townsend.
- 4.—Care of Salamanders and Frogs in Captivity, Mellen.
- 5.—Care of Small Salt Water Aquaria, Mellen.
- 6.—Administration of the Public Aquarium, Townsend.
- 7.—Notes on the Public Aquariums of Europe, Townsend.
- 8.—Books Useful to Aquarists, Mellen.

Besides these are ten mimeographed lists, prepared by Miss Mellen, of dealers, wholesale and retail, throughout the country, in plain and fancy goldfishes, native and tropical fishes for home and pond, snails, plants, wholesale and retail, live and dried fish foods, natural history specimens, bass and trout fry and eggs, aquariums and aquarium utilities, etc. These are constantly reduplicated and brought up to date, and are much in demand.

holding above 20 gallons of water, L. angle-iron is generally used, except in the case of very large tanks such as are seen in public aquariums. For these big tanks, some of which in the New York Aquarium are five by three by three feet, cast iron one-quarter inch thick is employed, and the glass is one-quarter of an inch in thickness. The bottom is concrete over iron. For aquaria of lesser capacity than twenty gallons, iron or brass may be employed. Iron can be painted or nicked, and brass can be lacquered and is more substantial. For an aquarium under fourteen inches in height, brass or iron one-thirty-second to one-sixteenth of an inch thick is best; for one higher than fourteen inches, iron should be used, one-eighth to three-sixteenths of an inch thick.

For the bottom of the tank either glass or slate is practicable. Glass can be putted to a wooden base, and ribbed glass does very well for this purpose. If slate is chosen, it should be three-quarters of an inch thick, and can be fastened with screws to the metal frame.

In a tank less than fourteen inches high, the glass should be one-eighth of an inch thick. In one of greater height, glass three-sixteenths of an inch in thickness is generally used.

One can make his own cement or can purchase it ready made. At the New York Aquarium we use Greenwood's Aquarium Cement, sold by J. W. Fiske of 78 Park Place, this city, at forty cents a pound. One cement is made of fine iron filings mixed with putty. Another cement is made with two-thirds parts of whiting and one-third part red lead mixed with powdered graphite, and these mixed with boiled linseed oil. Eugene Smith, in his book *The Home Aquarium*, now out of print, says a good cement of lasting qualities is made of one part each of white sand, plaster of paris and litharge, and one-third part powdered resin made into a stiff paste with boiled linseed oil; but it grows very hard and makes the replacing of broken glass somewhat difficult. The cement used in the Plymouth Aquarium in England is made of genuine white lead formed into a stiff putty with powdered whiting, to which is added a little Russian tallow to prevent it from hardening too soon.

We are asked occasionally about the advisability of painting the inside of fish tanks, garden pools, etc., and particularly about painting them green. One aquarium manu-

facturer informs us that chrome green (powdered) could be mixed with the cement and when the tank or pool is dry, it could be repeatedly filled with water for a few days and then allowed to stand several weeks, when it would be safe for the introduction of fishes. Another expert says that paint may be mixed with boiled linseed oil and left till thoroughly dry, when the tank or pool should be filled with water and allowed to stand for a week or ten days, after which it should be thoroughly washed out several times, and will then be harmless to the fishes.



OLD PICTURE OF JENNY LIND

Published in 1850, when she sang in Castle Garden, now the Aquarium building. Presented to the Aquarium library by Mr. F. S. Whitman, whose family received it from Mr. Russell Hinckley, then living in New York

REVERBERATIONS

(At the Aquarium)

To what do they listen, those silent swimmers,
Bright bits of color, frayed and angular,
Scraps from the work-shop of the Maker-of-Sunsets?
What do they hear, as they poise—inscrutable—
Or drowsily drift thru the squares of water,
Where surprised bubbles dart to the glassy surface?
Does an echo of Jennie Lind's voice still linger,
So wan and frail that we may not hear it?
Or do the feet of the foreign millions—
Seeking Liberty—seeking Haven—
Vibrate yet in the mellowing rafters?

FAITH VAN VALKENBURGH VILAS
in the *Evening Post*.

Aquaria and Vivaria.—The Zoological Society is in receipt of a letter from a new member, Mr. Stephen Haweis, the gist of which is as follows: Mr. Haweis was struck by a recent newspaper article which told of the delight that poor City children experience in catching frogs and turtles at a summer camp, and he felt that the children and their teachers should be given a better understanding of these and other small animals, that they might take an interest in endeavoring to maintain them in captivity, rather than in destroying them. He suggests that frogs and toads, snakes and turtles, are generally found more frequently than are hardy little fishes, and that a vivarium with a live toad tame enough to eat from one's hand is more lively and cheering than an "elaborate rockery designed to set off the charms of a glass marble and a china swan." Mr. Haweis thinks that insect cages would also prove worth while (and after seeing some grasshoppers in the University of Pennsylvania so tame that they would not attempt to hop off the hand that fed and cared for them, we quite agree with him), and he suggests that much can be done "with a soap box, a bit of glass, and some wire netting, combined with a little intelligent love and ingenuity." He asks if the Zoological Society will not instruct people in the maintaining of vivaria and maintain some model vivaria similar to the small model aquaria shown for some years in the New York Aquarium.

The fact of the matter is that the Zoological Park at all times gives free information and advice regarding the care of vivaria, and maintains some exhibits of this kind, and has issued a booklet on the care of the alligator. An article in this number, on the construction of small aquaria, is followed by a list of free leaflets issued at the Aquarium in addition to verbal instruction given there. Both the Aquarium and the Zoological Park, therefore, are engaged in imparting free advice with relation to the needs of aquatic and amphibious animals held captive, and are happy to do anything in their power to advance the cause of and engender a love for the lower forms of life, which, if maintained in health and happiness lend much charm to the home and the schoolroom, and afford a species of pleasure not to be derived from any other source.

The School Nature League with whom we also co-operate, is doing excellent work in acquainting children of the poorer sections of New York City with the proper methods of caring for small animals in captivity.

—I. M. M.

NEW INFORMATION ON THE GALAPAGOS TORTOISES

By C. H. TOWNSEND

THE writer is preparing for publication by the Zoological Society an account of the giant land tortoises of the Galapagos Islands in their relation to the American whaling industry of the past generation.

It has long been known that whaleships cruising in the Pacific visited the Galapagos Islands for the purpose of securing tortoises for food, as these animals could be kept between decks for several months without feeding. The material upon which this study is based is contained in the logbooks of whaleships preserved in the libraries of New England historical societies.

The records in the logs of 127 vessels already examined show that nearly 12 thousand tortoises were taken from the Galapagos Islands during the period from 1831 to 1868.

As there were during a part of this period more than 700 vessels in the American whaling fleet, it is evident that the logbook records at hand account for but a small proportion of the number of tortoises actually taken from these islands. Although whaleships called at Narborough, Tower and Jervis islands, there

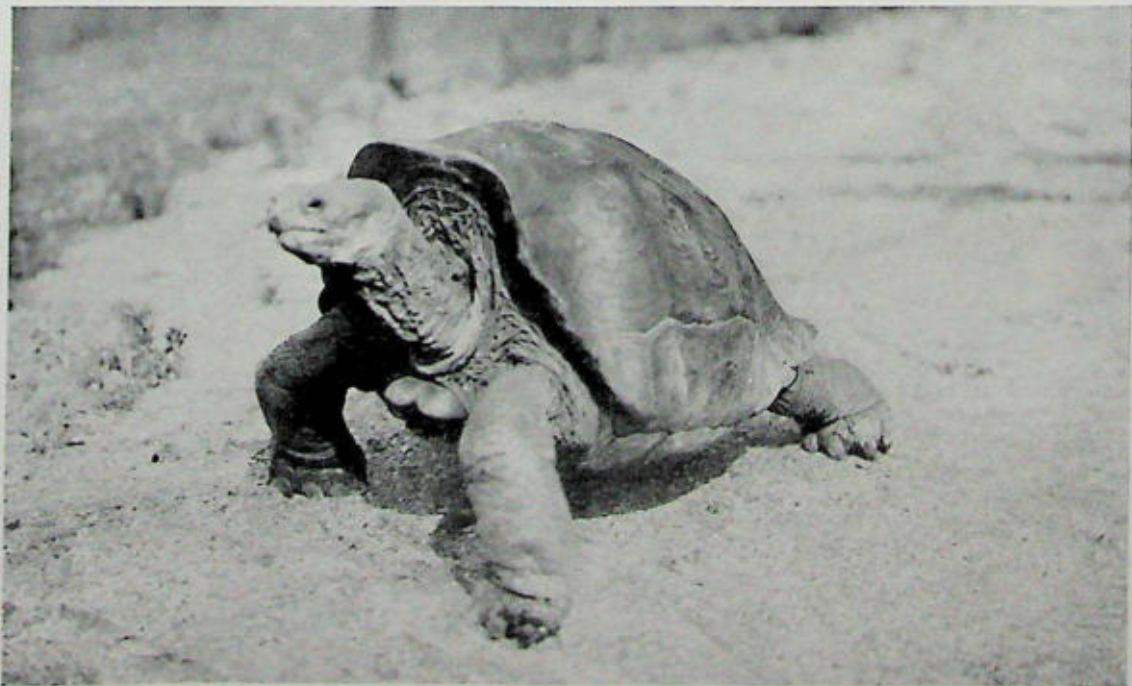
are no records in the logs to show that tortoises were found on any of them.

As the records mention the separate islands where tortoises were obtained, the demands made upon the supply of each island area can readily be set forth. The largest numbers taken during the above mentioned decades were from Chatham Island, the yield from other islands being in the following order: Albemarle, Charles, Hood, James, Abingdon, Duncan, Indefatigable, and Barrington.

The small island of Barrington yielded a few tortoises as late as 1853. The Barrington Island tortoise and the species inhabiting Chatham and Charles islands are now extinct, while those of all other islands except possibly Albemarle are on the verge of extinction. Each island of the Galapagos had its own species of tortoise.

The logbook records so far examined also show that whaleships made their heaviest catches of tortoises during the thirties, when certain vessels took away more than 300 each at a single visit.

The average catch of tortoises per vessel from 1831 to 1868 appears to have been 86, the tortoises taken usually being of as large a size as one man could carry in slings on his back. In a few instances tortoises too large



A GALAPAGOS TORTOISE IN THE NEW YORK ZOOLOGICAL PARK

Photograph by Elwin R. Sanborn



PUFFER (*SPHEROIDES MACULATUS*). ABUNDANT IN LOCAL WATERS

Photograph by Elwin R. Sanborn

to be moved were killed and the meat taken for immediate use.

The data at hand were compiled chiefly at New Bedford, Salem and Nantucket, Massachusetts. The writer is still engaged in the search for old logbooks of whaleships, and will be grateful for information respecting the location of similar records preserved elsewhere.

No attempt has yet been made to locate repositories of whaleship logbooks in other countries.

The Executive Committee of the Zoological Society has signified its intention to procure if possible living specimens of the giant tortoises believed to exist in the high interior of Albemarle Island. The edible value of these great tortoises is sufficient reason for an attempt to locate a number in some southern locality yet to be selected, where suitable climatic and food conditions would favor their increase. Their preservation in the Galapagos where natives and wild dogs are equally destructive seems to be quite hopeless.

In the March, 1924, number of this Bulletin will be found an account of the highly successful efforts that have been made toward establishing breeding colonies of the giant

tortoise formerly abundant on Aldabra Island in the Indian Ocean.

AN ANTI-MOSQUITO WAR IN LOWER MANHATTAN

THE Aquarium is playing an important part in a campaign against domestic mosquito breeding in the Bowling Green section of the city. An exhibition showing how mosquitoes breed has recently been installed and is proving a very attractive and valuable educational feature.

The Bowling Green Anti-Mosquito Association, Inc., which is carrying on the campaign, was recently organized at the home of Henry L. Doherty, atop the Battery Park Building, No. 24 State Street. Its area of operation is south of Rector and Wall Streets. The officers and directors of the association are Wm. T. Donnelly, President, W. G. Jones, Vice-President, K. B. Conger, Treasurer, F. H. Adler, Auditor, Henry L. Doherty, Alfred V. Johnson, L. L. Mowbray, and C. H. Townsend; the Executive Secretary is H. B. Maurer, with headquarters at No. 17 State Street. A "General Committee" is made up of Geo. Gordon Battle, Wm. F. Dalzell, Alvah H. Doty, M. D., Henry B. Johnson, Thomas F. Lynch, John T. Pratt, Herbert K. Twitchell and Henry D. Walbridge.



MOSQUITO LARVAE

On the evening of June 17, H. B. Maurer, the Executive Secretary, delivered an illustrated lecture, at the home of Mr. Doherty on "Mosquitoes and Their Extermination," which was attended by the Superintendents of Buildings in lower Manhattan, City officials and prominent citizens. On that occasion, Mr. Doherty made a brief address from which we quote as follows, as showing the great necessity for the campaign: "During the time I was building this house, I saw the night watchman of this building with his hands and face badly swollen by mosquito bites. On one occasion his eyes were nearly swollen shut. From the unbearable condition that prevailed when I built this house, I have reduced the nuisance to mere annoyance. I failed completely to eliminate the mosquito and yet I get only the over-flow from the surrounding neighborhood. While I am generally free from the annoyance, I know that many others of you who dwell on these buildings can't sit out fifteen minutes and not get more punishment by mosquitoes than I shall probably get in a whole week.

"It is proposed to free this section of the city from mosquitoes if we can arouse the proper interest and co-operation. We believe that if we can demonstrate that one section of the city can be freed from the nuisance, we can arouse enough interest and enthusiasm to free every section of the city. Work already done

should materially lessen the number of mosquitoes in Battery Park and we hope to be able to tell the people from all sections of the city that there is one park to which they can come and sit in the evening and not be pestered."

A thorough and systematic inspection of roofs, fire escapes, back-yards, cellars and other places where water is likely to become and remain stagnant is going on vigilantly. The canal boats, which lie for months along the river front and other water craft are not over-looked. On these many breeding conditions have been found. The sewer catch basins, of which it has been said "The man who designed the typical city sewer catch basin befriended the mosquito," are regularly inspected and will be oiled when breeding is evident. The B. M. T. and I. R. T. subway companies, as well as The City Railway Company have gangs of men at work who keep the pans under the ventilating gratings dry during the season, as these have been known to be very active mosquito breeders. Substantial cards, seven by eleven inches in size, are everywhere distributed, displaying by illustrations, how the mosquito looks as well as its life cycle and stating simply and concisely how the mosquito breeds, where it breeds and what precautions are to be taken to prevent breeding. Every other possible educational and preventive agency is at work. Considerable corrective measures have already been applied to conditions which heretofore have been very menacing.

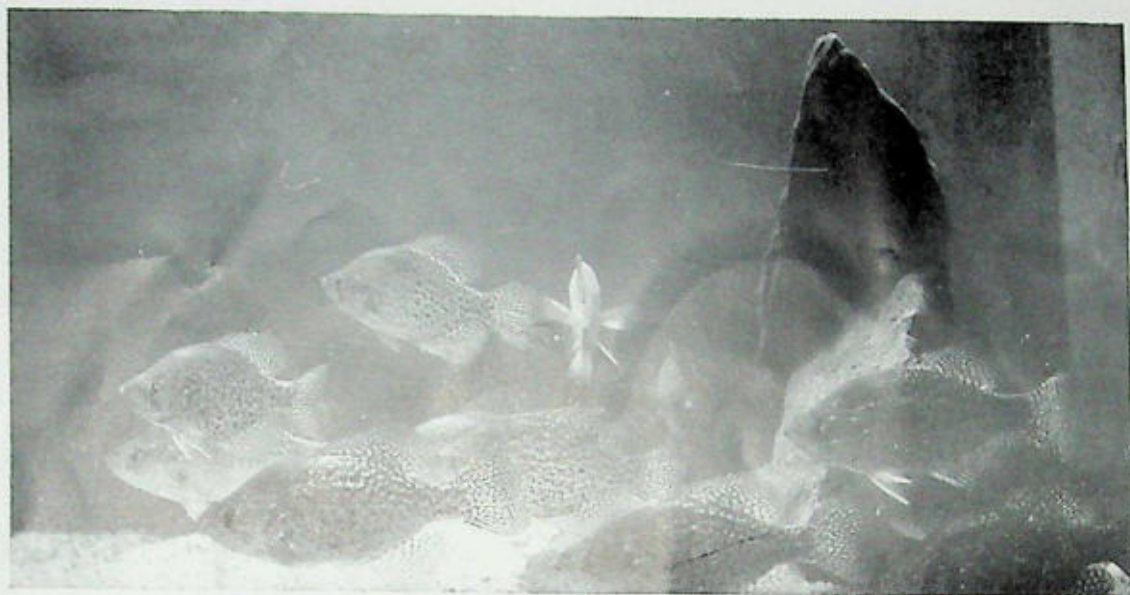
HOW MUCH CAN A FISH LEARN?

By IDA M. MELLE

IT is always somewhat of a shock to consider that an animal as highly organized as a fish not as clever as some of the invertebrates. Naturally we should prefer to find the intelligence of animals increasing along with their physiological development; but evolution is based upon structure and not upon intelligence.

Somewhere it has been suggested that if ants were of human proportions, they would rule us.

Many of the lower animals less intelligent than ants and bees have proved capable of receiving instruction and retaining it for a certain period of time. Even starfishes taught a lesson 10 times a day for 18 days, remembered it for a week, the lesson consisting of righting themselves by the use of certain arms, the other arms being fastened with rubber bands.



AN ATTRACTIVE GROUP OF CALICO BASS WHICH HAVE LIVED MORE THAN TEN YEARS
IN THE AQUARIUM

Photograph by Elwin R. Sanborn

Fishes, like other animals, learn most speedily a lesson connected with food, such as the place where food is thrown to them and the time of day they may expect to receive it.

A story has been going the rounds for several years to the effect that a bass, separated from some minnows by a glass partition, learned not to strike at the minnows since it only resulted in a bruised snout, and when the partition was removed the minnows swam around the bass without molestation.

It became necessary to run this story down, in order to answer our inquiries intelligently; and it turned out that just such an experiment had been made, using pike, flounders and perch. In 1875 one Möbius published in German an account of his experiments with pikes, which showed that these fishes learned not to hammer their snouts against the glass partition which separated them from certain small fishes of a species on which they habitually preyed.

In 1889, Bateson published a paper stating that flounders could not learn this lesson, and in 1901 Triplett published in the *American Journal of Psychology*, the results of his experiments with perch, which are of great interest in the study of animal psychology. He reports that in a month the perch had learned to pay no heed to the minnows on the other side of the

glass partition, and when the partition was removed, did not eat them. Yet when a minnow, during removal, slipped over the partition and swam rapidly in front of the perch, one of them instantly gobbled it. On one occasion, after the glass partition was removed, the perch merely eyed a minnow and did not attempt to molest it as long as it swam quietly around them, but when it began to move rapidly, one of them snapped it up.

All of which proves that fishes can learn certain things, but we cannot say how long they will retain the memory of the lesson in a case like the one described.

There is something about an object moving quickly in the water, especially when moving downward, that irresistibly attracts a fish. In a happy family balanced tank in the Aquarium library several years ago, among various species were small sunfish and top minnows. The sunfish had never interfered with the minnows or offered to molest them; but on one occasion I found a minnow on the floor, and hastily picking it up, dropped it back into the tank. It started toward the bottom, whirling, head down, and was immediately swallowed by a sunfish almost as large as itself; and it seems doubtful if a fish ever could be taught to overcome its natural gustatory interest in a smaller fish moving swiftly in front of it.

THE FISH HATCHERY AT THE AQUARIUM

By THOMAS HOWLEY

THE battery of glass jars, constituting one of the principal parts of our fish hatchery, is mystifying to many visitors. "What is it, a distilling apparatus?" some ask. Others want to know if it is a water purifying device; or something for heating or chilling the water supply; or (bright idea) a new home brew outfit!

What it really is, is an exhibit showing in model form the methods employed in hatching fish eggs in the large hatcheries of the Canadian and United States Bureaus of Fisheries, as well as in our state hatcheries. But it is only for the hatching of eggs that are of a glutinous nature: non-glutinous eggs of fresh-water fishes are hatched in wire trays.

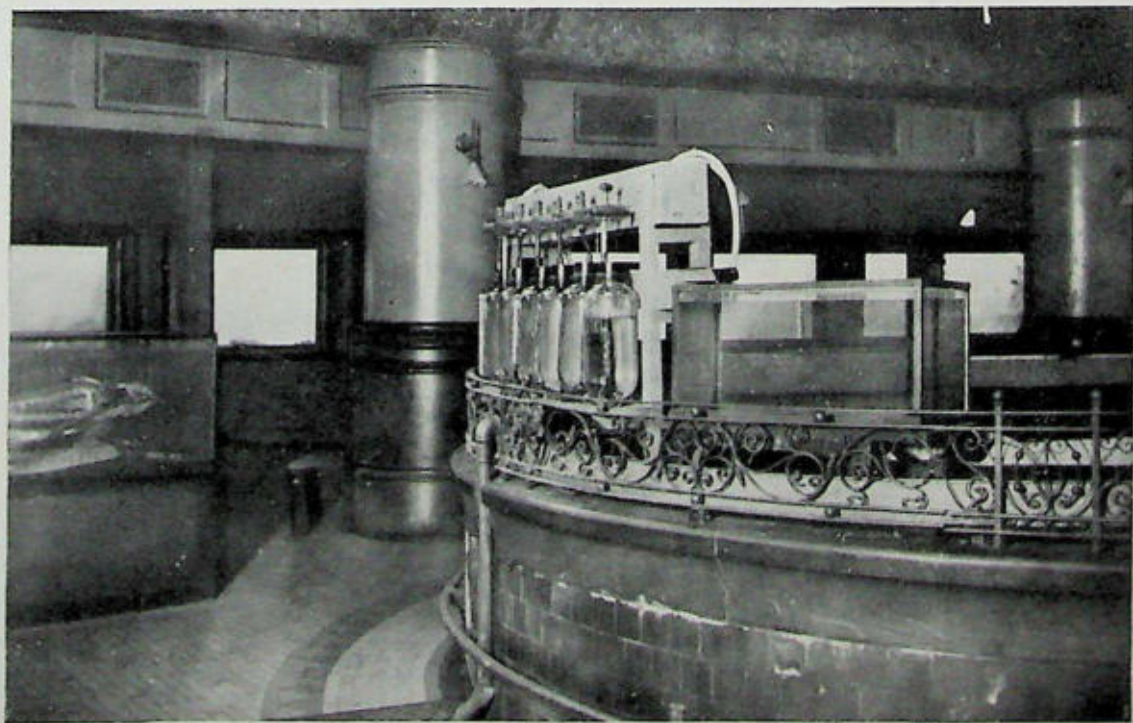
The principle employed in this hatchery to keep eggs from adhering, is a current of water. Water flows down into the jars through a tube in the center, and the eggs are separated as the water rises. Like a ball in a shooting gallery, which revolves on a stream of water, the eggs, revolving in somewhat the same manner, do not have a chance to adhere.

Typically adherent eggs are those of the whitefish, pike perch, lake herring, buffalo fish, and shad.

When the eggs hatch, the active fry are carried by the current over the top of the jar to a narrow trough which conveys them into the receiving tanks. These tanks, in the New York Aquarium are represented by small aquaria—about fifteen by fifteen by twenty-four inches. Receiving tanks used in the fisheries industry are of large size, some being twelve feet square by four feet deep, others being three feet wide, four feet deep and fourteen feet long. Our glass jars number only six, while some large hatcheries have 1200 jars in operation.

Fry from the New York Aquarium hatchery are turned over to state authorities and planted in suitable waters. In one instance, in April 1923, half a million whitefish fry a few weeks old were shipped to Fort Ticonderoga, New York, to be planted in Lake Champlain.

Proposed Aquarium for Milwaukee.—The Director of the Aquarium addressed the Athletic Club in Milwaukee on June 23, 1924, on the Public Aquariums of the World. The object of the gathering was to excite interest in the proposition of an aquarium for Milwaukee.



SIDE VIEW OF HATCHING BATTERY FOR THE INCUBATION OF GLUTINOUS FISH EGGS

One of the receiving tanks is shown at right

Photograph by Thomas Howley.

MORE ABOUT SPIDER WEBS AND SPIDER WEB FISH NETS

By E. W. GUDGER

Associate in Ichthyology, American Museum of Natural History

FIVE years ago I published in this journal¹ an account of the use by the natives of certain parts of New Guinea of a dip net made of a large spider web. Later in the same year when more data had come to hand, I published another article² on this subject. And now comes this third account in which will be found new and interesting corroboratory data.

The reader who has not seen the articles in question may be pardoned if he queries whether spiders can weave webs strong enough to be used for fish nets. The webs woven by our common garden varieties of spiders certainly are too small and too weak for such a purpose but not so those of warmer climates. A few brief accounts of such webs, sufficiently large and strong to catch ordinary birds and hence strong enough for fish nets, will be given and then we will proceed to the matter of present interest.

More than two hundred and fifty years ago Richard Stafford wrote from the Bermudas a letter to the secretary of the Royal Society of London. This was published in the *Philosophical Transactions*, 1668, vol. III, pp. 792-795. In his quaint account we read that: "Here are spiders that spin their Webbs betwixt trees standing seven or eight fathom [sic] asunder. . . . This Webb when finishd, will snare a Bird as big as a Thrush." And he forestalls criticism by saying that he has sent with his letter a piece of one of these webs for examination.

Lord George Campbell in his "Log-Letters from the Challenger" (new ed. London, 1881, p. 512) confirms Moseley² (previously quoted) that on Ke Island near New Guinea they found a "glossy starling . . . caught fast and helpless—exhausted with struggling in the strong web of a large spider. . . . These webs are immensely strong and so glutinous that I doubt if this bird, which was the size of a large linnæus, would have been able to fly away even if it had got out of the web."

Coming now to 1883 when the English version of Ernst Haeckel's "India and Ceylon" was

published, we read on page 33 that on an excursion out from Bombay Haeckel saw "Immense cobwebs one to two metres across (which) were stretched between the branches (of trees). . . . the threads of this web were astonishingly firm and tenacious, as strong almost as linen twine."

This is confirmed by Col. D. D. Cunningham in his book "Plagues and Pleasures of Life in Bengal" (London, 1907, p. 204), who says of spider webs at Calcutta:

"So strong, indeed, are they that even relatively powerful and vigorous birds may be taken captive by them—not that they ever remain hung up in the snares in their original position, but because, in tearing their way through, they carry away such masses of cordage closely wrapped around them as to render further flight impossible."

In 1886, Guillemard³ wrote of a spider and her web observed at Kudat, British North Borneo.

"In one of my morning rambles I came across a small bird (*Mixornis bornensis*) fast entangled in the web of a spider of the genus *Nephila*. These structures in the tropical forests of this part of the world are often of large size and great strength, but I was astonished to find that they were sufficiently strong to capture a bird which, in this instance, was as large as a goldfinch."

In my second paper above noted, I quoted Douglas Rannie ("My Adventures among South Sea Savages," London, 1912, p. 94) that at Toman Island he had seen a native use a bag made of spider web in which to carry various articles; and A. S. Meek ("A Naturalist in Cannibal Land," London, 1913, p. 123), that the natives of the Aroa River District, New Guinea, "use the web (of a large moth there) as a head-dress to keep out the rain. It is perfectly water tight." So John Gaggin in his "Among the Man-Eaters" (London, 1900, p. 105) says that the inhabitants of Malicola in the New Hebrides use the web of a spider there as a kind of cloth, making out of it small bags in which they keep arrow-heads, tobacco and even the dried poison which they use for their arrows.

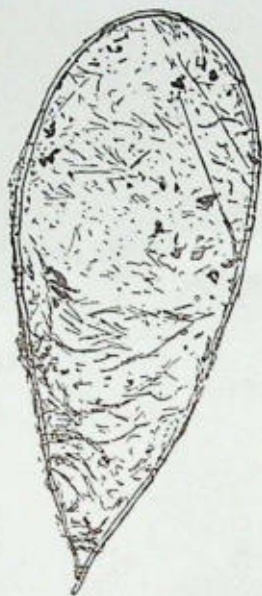
Such large webs are also found in the island continent. Spencer and Gillen⁴ in the lower steppes of central Australia found webs made by *Nephila eremiana* so large and strong as to

¹ Gudger, E. W. The Most Remarkable Fishing-Net Known. The Spider's Web Net. Bulletin N. Y. Zoological Society, 1918, vol. xxi, pp. 1588-1590, 2 figs.—On Spider Webs and Spider Web Fish Nets. Ibid., vol. xxi, pp. 1687-1689.

² Moseley, H. N. Notes by a Naturalist on the Challenger, etc. London, 1876.

³ Guillemard, F. H. H. Cruise of the Marchesa to Kamshatka and New Guinea. London, 1886, vol. II, p. 104.

⁴ Spencer, Baldwin, and Gillen, T. J. Across Australia. London, 1912, vol. I, pp. 69-70.



SPIDER WEB NET, ADMIRALTY ISLAND

be quite annoying to them as they rode through the scrub. "The web stretches across from tree to tree for a distance of often twelve to fifteen feet and reaches a height in the middle of fully six feet." The largest spider measured had a body two inches long with a span of spread-out legs of four inches.

But such large webs are also found in the southern part of our own country, as witness a letter dated July 28, 1919, from Mr. Charles H. Baker of Zellwood, Florida. Mr. Baker is a botanical student and collector of twenty-five years' residence and experience in the central part of the peninsular state. He writes that when out collecting he frequently runs across the largest spider in Florida and possibly in the United States—*Nephila plumipes*. "A full grown female will have an extreme height of four and a quarter inches or upwards, while the crural spread may occupy an ellipse of two and one half by four inches. . . . The web of this *Nephila* . . . is golden yellow and very brilliant and beautiful. Its stays and guys extend over a diameter of five to six feet or upwards, with the closely orb-woven center three to four feet across."

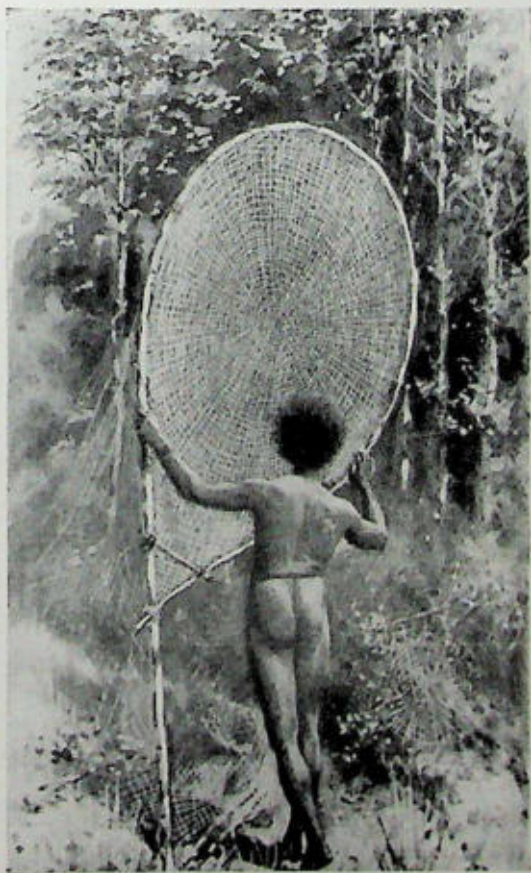
From this careful description one is prepared to learn that this web is very strong and resistant and that in such a web one finds a large variety of insects of all sizes and kinds. But one is not prepared for the next sentence in Mr. Baker's letter. "I have also found it hold-

ing one of our small green tree-frogs, on which the female was feeding. One would think that its peculiar twistings and struggles would have freed it directly from bondage, but they certainly had not in this case."

Mr. Baker adds that he is accustomed to colonize this species before certain windows of his house where the light at night attracts a swarm of insects for the sustenance of the spiders, and that there was before one of his windows as he wrote a web fully six feet in diameter.

C. A. Ealand in his interesting book "Animal Ingenuity of To-day" (London and Philadelphia, 1921), facing p. 128 gives the figure of a bird caught in a spider web with the following legend: "This enormous Madagascar spider spins webs so strong that birds are caught and held in them."

Let us now come to the use of such spider webs for catching fish, and consider first an intermediate form of net. My second paper above noted ended with an incident related by



NEW GUINEA WEB NET
A Native of New Guinea with His Spider Web Fish Net.

H. B. Guppy⁵. While on Treasury Island (one of the Solomons) he was very anxious to get some small fish from a brook to send to the British Museum, but he had no net. However, his native attendants bent a supple twig into a hoop and spread over it a strong spider web found in the woods nearby. This hoop they buoyed up on the surface of a pool by resting it on two parallel sticks and, having shaken over the web an ants' nest thus covering it with insects and grubs, let it float down the stream. The little fishes attracted by the struggling grubs began jumping up at these, apparently not noticing the transparent web, and, getting their snouts and gill covers entangled in the web, were easily caught.

Such a procedure is also practiced elsewhere in the South Seas, as the following accounts will show. In a personal letter from Dr. W. G. Woolnough, late Professor of Geology in the University of West Australia at Perth, and a fellow of the Geological Society of London, I have another eye-witness description. He writes that while making geological explorations in Viti Levu, the largest island of the Fijian group, in the year 1905, he witnessed a similar occurrence. His party had run out of rations and to retrieve the situation his native "boys" made a framework of bamboo, covered it with cobwebs in which were entangled spiders and various insects, and let it float from one end of a pool to the other. Small fish rising to catch the spiders were entangled as described above by Guppy.

Further details as given by William Deane⁶, late principal of the Teachers' Training College in Fiji, and it seems well to quote his short paragraph, which however seems to indicate that this kind of net is not used nowadays.

"A very interesting substitute for the net was employed in earlier times. A man who had learned it as a boy in Ra told me of it. A piece of reed was taken and bent into a circle, the ends being firmly tied. Afterwards a short handle was attached. The operator went into the woods and found strong spider-webs in which he waved the bent reed many times until it became quite covered with them. The handle was taken away and the reed-hoop, so enveloped, was laid on the top of the water in a stream, where it floated. The fisherman then put into it small grasshoppers and flies; or he

threw little pebbles, or spat within the circle. The fish rose like trout, and in their eagerness to get the bait were caught by the gills and fins in the spider-web."

Now as to the use of spiders' webs in making dip nets for fishing, the evidence is as follows from actual eye-witnesses. The first account is from the pen of E. H. Pratt⁷ a natural history collector of wide experience in New Guinea, and is given in full in my first article. Briefly, he says that the Papuan bends a bamboo into the shape of an exaggerated tennis racket and leaves it in the bush where the spiders are thickest. This accommodating beastie finding a convenient framework at hand uses it for the support of a web whose mesh varies "from an inch square at the outside to one-eighth inch at the center." The crafty native then takes his made-to-order net, goes down to the nearest stream, and uses it to catch fish up to about a pound in weight, the net with careful handling suffering no hurt by its immersion. One of Mr. Pratt's interesting figures is reproduced herewith.

Pratt's story was ridiculed, and indeed a number of other explorers in New Guinea intimated pretty strongly in their books that he was either grossly deceived or else was making up the matter out of the whole cloth. However, the very next year witnessed the publication of Hardy and Elkington's fascinating work "In the Savage South Seas" (London, 1907, p. 107) in which is found this statement: "Some (fishing nets) are even made of a tough spider's web." However, as they give no further data, we are left somewhat in doubt as to whether or not they actually saw such a net.

Curiously enough all these observers had been anticipated by the missionary R. H. Codrington in his work "The Melanesians. Studies in their Anthropology and Folk-Lore," (Oxford, 1891, p. 318), who contents himself with saying that "In Leper's (Aoba) Island (one of the New Hebrides) small fish are caught in nets made of spider's web." It is unfortunate that he gives no details whatever.

Furthermore some years later Pratt was absolutely vindicated and his critics completely nonplussed when R. W. Williamson⁸, a student of anthropology, published two books giving accounts of his experiences in New Guinea and

⁵ Guppy, H. B. *The Solomon Islands and their Natives*. London, 1887, p. 158.

⁶ Deane, William. *Fijian Society, or the Sociology and Psychology of the Fijians*. London, 1921, p. 189.

⁷ Pratt, E. A. *Two Years Among New Guinea Savages; a Naturalist's Sojourn Among the Aborigines of Unexplored New Guinea*, London, 1906, p. 266.

⁸ Williamson, Robert W. *The Mafulu Mountain People of British New Guinea*. London, 1912, p. 193; *The Ways of South Sea Savages, etc.* London, 1914, p. 231.

in each is found the following explicit account of what is done at Mafulu a mountain district inland from Yule Island and Redscar Bay.

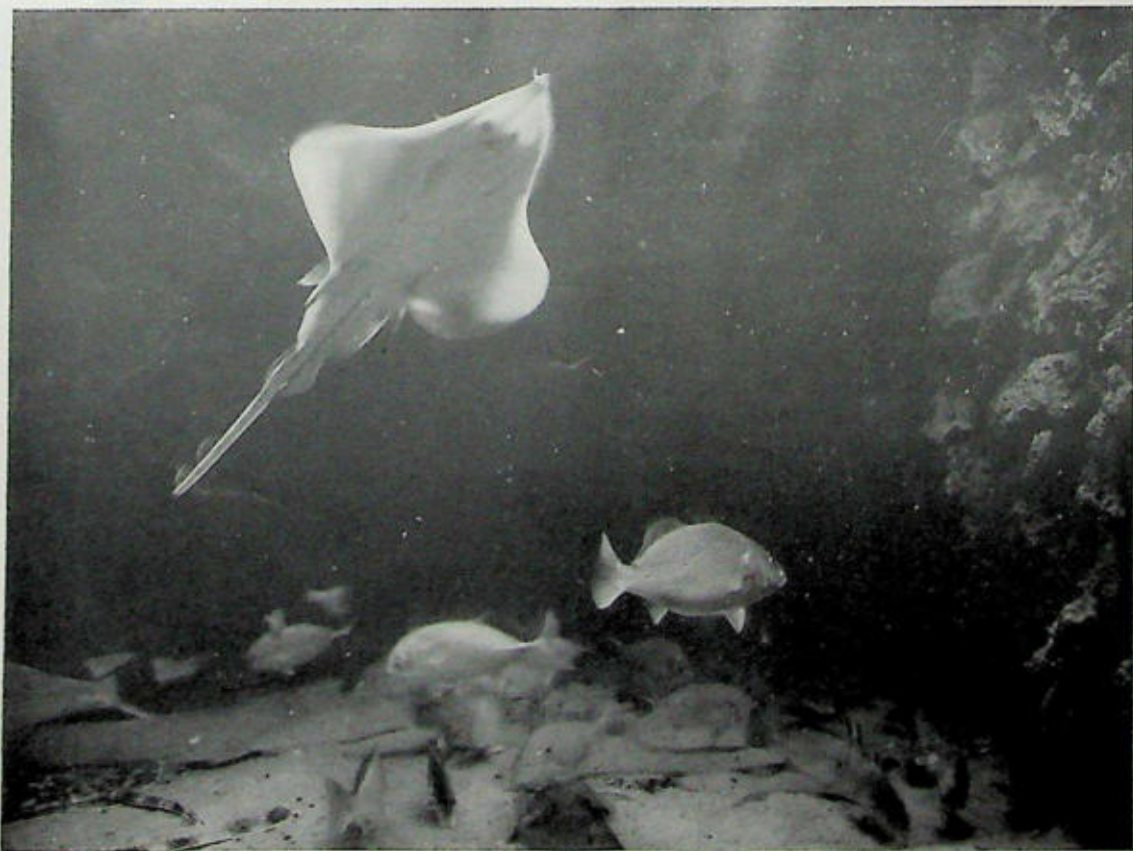
"The other form (of hand net) is also framed on a looped cane; but the loop in this case is larger and more oval in shape, and the netting is made of the web of a large spider. To make it they take the already looped cane to where there are a number of such webs, and twist the looped end round and round among the webs, until there is stretched across the loop a double or treble or quadruple layer of web, which, though flat when made, is elastic, and when used becomes under pressure more or less bag-shaped."

There is now to be presented a drawing of an actual spider web net. This is found in a plate illustrating an article "Fischerie" by H. Lübbert in Heinrich Schnee's "Deutsches Kolonial Lexicon," Leipzig 1920 (vol. I, plate 57). Un-

fortunately there is no reference to it in the article and the explanation to the plate merely says "Spider web net, Papitalai, Admiralty Island."

However, in conclusion it is fortunate that there can be quoted an account by another eyewitness of the highest standing. Always on the lookout for books on New Guinea and the South Seas which may contain interesting natural history material, I read with great pleasure Captain C. A. W. Monekton's "Some Experiences of a New Guinea Resident Magistrate," London, 1921; (published in America under the title "Taming New Guinea"), and "Last Days in New Guinea" (New York, 1922) but found no spider web fishing nets. However, learning through a mutual friend that Captain Monekton had seen such nets, I wrote him and in reply had the account with which this article is concluded.

After warning me that his account was "from memory of nearly twenty years ago," he gives the following very clear cut statement:



THE CLEAR-NOSED SKATE IN FULL FLIGHT

It is the under surface of the fish that is seen here
Photograph by Elwin R. Sanborn.

New York Zoological Society



OBJECTS OF THE SOCIETY

☞ A PUBLIC ZOOLOGICAL PARK. ☞ A PUBLIC AQUARIUM. ☞ THE PRESERVATION OF OUR NATIVE ANIMALS. ☞ THE PROMOTION OF ZOOLOGY.

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WILLIAM BERRY,

Director of Tropical Research and Honorary Curator, Birds

Each author is responsible for the scientific accuracy and the proof reading of his contribution.

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"The spider web fish net is used by the natives of the Trobriand Islands, also by the natives living on the north eastern coast of New Guinea just south of the frontier of what was Kaiser Wilhelm's Land (German New Guinea). As far as my knowledge goes it was only used by the latter people for catching small prawns or shrimps in tidal streams. Such prawns or shrimps were baked into lumps of paste, shell and all, and eaten holus-bolus.

"In the Trobriand Islands the net was used for catching slow-swimming sluggish fish in the recesses of coral reefs. I have seen fish weighing up to three and possibly four pounds secured in such nets; but it must be remembered that these fish would not have the kicking or fighting value of even a one pound trout; for when entrapped, after a feeble kick or so, they would remain quiescent in the net.

"The net was made by the natives winding the web spun by a large spider (the species of which I am ignorant) across the fork of a shrub. The web is simply twisted

flat across the fork of the handle, no bag whatever being left, the elasticity of the web forming a bag when the weight of a fish is felt. In some cases only one web is used on the fork; in others two, three, or four are superimposed one upon the other, thus adding much to the tensile strength of the net. There was one web very common in the jungle paths, and the tensile strength of it was such that, when bumped into, one or two strands of it were sufficient to pull from one's head an ordinary service helmet.

"One peculiarity of the spider web net was that in the water it appeared quite invisible to the human eye; the fork one could see and the entangled prawns or fish, but not the actual net. The net also did not appear to be very perishable, as I have seen natives take one from a wall or house where they have apparently been resting for some days, make a patch or so, and go off fishing.

"The same net was used by the Trobriand natives for the purpose of catching small birds, butterflies, moths and bats, for A. S. Meek, a collector for Rothechilds' Museum."

These accounts corroborating the various narratives given in my two previous papers, may be taken as settling in the affirmative the question as to whether spider webs are used as fishing nets.

The Flightless Cormorant.—Our specimen of the flightless cormorant from the Galapagos, pictured in the March 1924 *Bulletin*, lived only a few months in the Aquarium, having fallen a victim to drafts and exposure during the work of building reconstruction. It never became friendly and sociable like the little penguin from the Galapagos, which has been with us now about a year and which soon learned to know the man who feeds it and to call out on seeing him, "More!" "More!"—the only sound it utters.
—I. M. M.

Box Tortoises Over 35 Years Old.—Last summer the Aquarium received two box tortoises which had been in the possession of Mrs. Jenny Brown of Brooklyn for thirty-five years.

Gilbert White in the *Natural History of Selborne* tells of becoming the possessor of a tortoise that had been kept in "a little walled court" in Sussex for forty years, hibernating every November and coming forth again every April. He says: "In a neighbouring village one was kept till by tradition it was supposed to be an hundred years old." C. H. T.



COL. JONATHAN WILLIAMS
OF THE UNITED STATES ARMY
Builder of West Battery, now the Aquarium

COLONEL JONATHAN WILLIAMS

By IDA M. MELLETT

THIS is the likeness of Colonel Jonathan Williams, an important figure in the history of the United States during the Revolution and of especial interest in the history of old New York because of his having been entrusted by the War Department over a century ago with the construction of the forts on Governor's Island and at the Battery.

He first completed Fort Williams, which originally bore his name but is now known as Castle William (some people erroneously believing it to have been named for an English king), and then undertook the construction of Fort West Battery on Kapske Rocks off the shore line of the Battery: a building destined never to fire a gun, but to undergo changes of name and function and attain fame successively as Fort Clinton, as Castle Clinton, as a concert hall and an immigrant station known as Castle Garden, and as the New York Aquarium.

Col. Williams was born in Boston in 1750 and died at Philadelphia in 1815, having attained distinction as secretary to Franklin

in Europe and as United States agent in Europe during the Revolutionary period, as well as by his feats of military engineering. In 1801 he was Commander of West Point, and he served as Chief Engineer of the Army from 1805 to 1812. He is frequently mentioned in the Military Papers of Daniel D. Tompkins, Governor of New York 1807-1817, published in three volumes by the state, in its Second War with Great Britain Series. The accompanying picture is copied from Volume 2 of this work. In one instance Tompkins refers to Williams as "Chief Engineer of the United States, whose services merit the highest encomium," and in 1814 he alludes to him as a general.

From the Colonel's letters and the evidence of existing documents concerning him, he appears to have been a man of great personal charm and highmindedness, as well as one of the foremost military men of his time.

A Sea Snake.—Late in January, 1924, Capt. C. H. Whitmore of the S. S. *Santa Olivia*, presented the Aquarium with a specimen of the yellow-bellied sea snake (*Hydrus platurus*) which had been washed onto the deck of his vessel by the sea. Although this species, like other sea snakes of its family, is poisonous, the crew handled it without fear and, fortunately, without injury. The specimen had been injured about the head and back, and was never induced to eat during its sojourn in the Aquarium, although live killifishes as well as strips of fish were offered it. The yellow-bellied sea snake is not uncommon in the waters of Mexico and South America, where fishermen, taking it accidentally, hold it in terror. Perhaps it was because of its injuries that our specimen was so docile and so inactive. It spent its entire time floating at the surface, motionless, and the only advantage derived from its presence lay in the fact that it gave the public an opportunity to view, for perhaps the only time in their lives, a sea snake. It is the only specimen ever exhibited at the New York Aquarium, and we regret that it survived only two months. It measured twenty-two inches in length. Director Townsend, while with the U. S. S. *Albatross*, secured several specimens of a similar sea snake, *Pelamys bicolor*, in the Bay of Panama, by lowering a few inches below the surface of the water, an insulated electric light, which attracted the snakes to the side of the boat so that they could be taken in a dip net.

—I. M. M.



BOWFIN (*AMIA CALVA*). SPECIMENS OF WHICH HAVE LIVED IN THE AQUARIUM SINCE 1903
Photograph by Elwin R. Sanborn



Vol. XXVII, No. 5.

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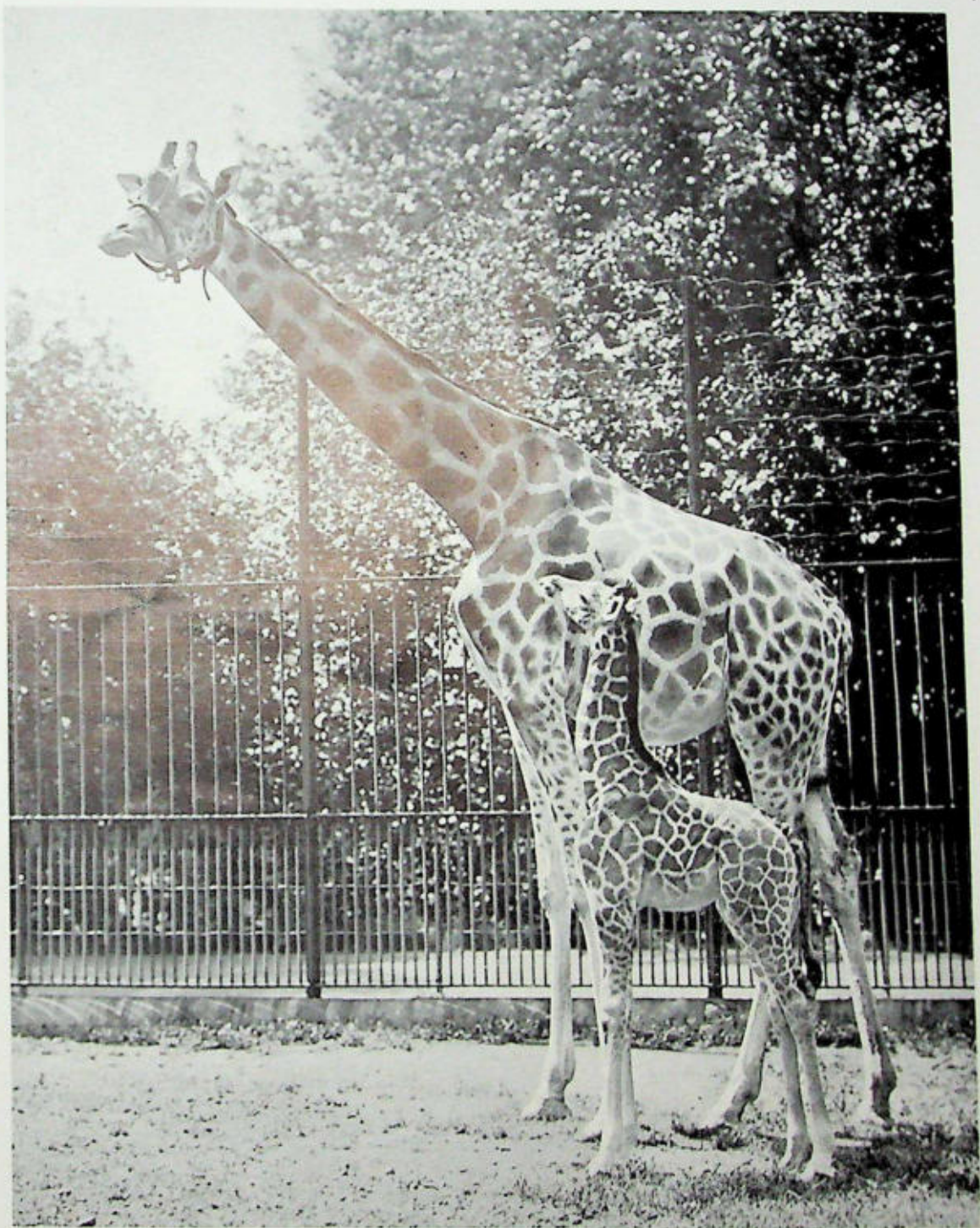
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FEMALE NUBIAN GIRAFFE AND HER BABY IN THE ZOOLOGICAL PARK

For the second time, the Nubian giraffe loaned to the Society by Ringling Brothers, Barnum and Bailey Circus has borne a youngster. The first specimen was very weak at birth and survived but a limited time, but what the first lacked, this youngster has in great abundance, and is thriving and growing beyond our greatest expectations. Both parents, the male belonging to the Park, are very gentle and tractable, but as is most frequently the case among young animals born in captivity—the baby is exceedingly wary.

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AN ISLAND IN THE PARANÁ THE BOVRIL ISLANDS OF SANTA ELENA, ARGENTINA.

By HERBERT FRIEDMANN, PH.D.

Illustrations from photographs by the Author.

THE Paran , one of the great rivers of a continent of mighty streams, holds, in its 2,600 mile course from Brazil to the La Plata, a chain of islands several hundred miles long and varying in width from one to thirty miles. Although river steamers running from Buenos Aires to Paraguay pass close by daily, these islands have escaped the destruction that marks the advance of civilization and are still just as they were when the Guaran  Indians held undisputed sway over the region. Here and there, to be sure, one may find a thatched hut of some lonely peon family or even a small clearing with several rows of neglected-looking maize, but such spots are few and far between. By far the greatest part of these islands is still covered by vast marshes broken up by innumerable streams and dotted here and there with open lagoons, while in the higher parts the grass vegetation of the lower portions is replaced by a fairly dense growth of trees and shrubs.

Beginning at the east shore of one of these islands opposite Santa Elena, a small town in Entre Rios, and following a winding stream in a general westward course, the topography, and, in consequence, the animal life changes quite markedly. Santa Elena has about thirty English and American residents, twenty-two of whom are subscribers to the National Geographic Magazine; probably a higher percentage than in any other town in the world. Before we actually begin our journey we may take a last look across the river to the east bank, and the

high, irregular, sand cliffs or barrancas of Entre Rios loom up in striking contrast to the low, swampy, wooded shore of the island, while here and there a Vigua cormorant¹ flies slowly by or a skimmer² plows its shallow furrow on the surface of the Paran . The river in this region is several miles wide but the distance is diminished by the clarity of the atmosphere.

Turning now to the west we cruise along the shore until we find a navigable stream leading to the interior of the island. Of all the waterways in this fascinating region of aquatic beauty, one stands out above all others known to me; a stream whose waters change in color from muddy-brown to clear bluish-green with a suddenness that is almost unbelievable, whose banks hold the secrets of a thousand forms of animal life, whose receding waves give glimpses of interesting crustaceans madly scrambling for cover, whose every passage rewards the voyager with rare sights and unexpected thrills, whose name is even interesting because its meaning is unknown,—the Caraj .

As we enter the Caraj  we find densely wooded banks on either side of us, fringed at the water's edge with a profuse growth of aquatic plants, the rich green of the whole relieved here and there by a touch of lavender where a water hyacinth rears its flowered spike above the dark, glossy, waxy leaves or some aerial plant adds a speck of color higher up. Every little while a bird starts from some unseen perch and flashes across the field of vision and disappears, enveloped in the foliage. Little green herons³ squawk at us as they clumsily leave their perches and laboriously flap away; limpkins,⁴ those curious brownish birds, half-rail, half-crane, desert their perches on the

¹*Phalacrocorax vigua*.

²*Rynchops nigra intercedens* (Saund.).

³*Butorides striata* (Linn.).

⁴*Aramus scolopacioides carau* (Vieill.).



A VIEW ON THE PARANA RIVER

The Parana, one of the great rivers of a continent of Mighty Streams, is 2600 miles long.

tallest trees with loud cries of *carau, carau* uttered in a harsh crackling voice, and with necks outstretched and legs dangling behind them as though they were misfits and really belonged elsewhere, fly away, while three species of kingfishers rattle along the edges of the stream and come to rest on some conspicuous twigs.

These kingfishers are all very numerous and all live on the same food, the small fish of the stream, and yet seem to get along very well indeed in close proximity to each other. The largest⁵ of the three, a bird about half as big again as our belted kingfisher is a splendid bluish bird with the throat, breast, and underparts chestnut brown, but has the white and blue on the head as in our local species. As we approach one of these kingfishers it pumps its tail vertically once, then as we come a little nearer it does it a second time, and at the third time it always flies. In shooting them I found this to hold in all cases;—this species invariably pumped its tail three times and at the third time it flew. The rattling call is like that of our belted kingfisher but much louder.

The second species is smaller than our local bird but very different in color,—dark glossy green above and white below,⁶ while the third⁷ is very small, the body being roughly about the size of a sparrow's. It is dark green above, white below and has a chestnut band on the breast. A curious thing about this trio is that the smallest seems to prefer low perches about two or three feet above the water, the middle one a little higher up, while the largest species

usually perches fairly high up, but this rule is not invariably adhered to.

Every once in a while we may see a pair of bulbous eyes and the tip of a snout just emerging from the muddy water and we are informed of the presence of a caiman. The caiman which replaces the alligator in South America looks



WOOD IBIS

Wood Ibises identical with our bird of the Southern States occur in great numbers.

⁵*Streptoceryle torquata cyanea* (Viell.).

⁶*Chloroceryle amazona* (Lath.).

⁷*Chloroceryle americana viridis* (Viell.).



MAGUARI STORK

This is the largest bird in these Marshes.

very much like the latter and is exceedingly common in these islands. Frequently four or five may be seen in the course of a couple of hours. In spite of their ungainly appearance on land, a caiman in the water is remarkably quick and agile. In the water they are at home and look not unnatural, but on land they seem a relic of a hoary past. I know of nothing that so

vividly brings to mind a sense of great antiquity, of past geologic epochs brought up to the present, than the sight of one of these great saurians basking in the sunlight of today.

Although themselves so aquatic they always build their nests back far enough from the water so that no waves may splash them and dampen the eggs. In fact on one occasion in another locality, I found a nest fully a third of a mile from any open water. The nest is merely a pile of dead and decaying reeds, leaves, straws, etc., and averages about four feet in height and six feet in diameter at the base. The eggs are buried in the middle of the nest and incubation is accomplished by the heat given off by the decaying vegetation of which the nest is built. The eggs are approximately three inches long and an inch and a half wide, elongate-oval in shape, white in color, and warty in texture. For reptilian eggs they are rather brittle and contain considerable calcium. Frequently several females lay together in one nest and the natives claim that as many as seventy and even eighty eggs are sometimes found in one nest. The largest number that I ever found was thirty-three. Often turtles lay their eggs in the sides of the caiman nests just as some North American species do in alligator nests.

Here and there on tall trees, particularly eucalyptus and blue gums, are huge composite nests of twigs, the whole mass often measuring five feet in length and four or five feet in width, and containing a great many individual nests. These belong to the gray-breasted parrakeet parrots⁵ and no one can pass them without learning the identity of the owners for the whole flock invariably begins to screech as loud

⁵*Myiopsitta monacha* (Bodd.).



A MARSH ON THE ISLAND

The large white birds in the distance are Maguari Storks.



A NATIVE HUT AT THE EDGE OF THE MARSHES

These Islands have escaped the destruction that marks the advance of civilization, and such spots as this neglected clearing are rare.

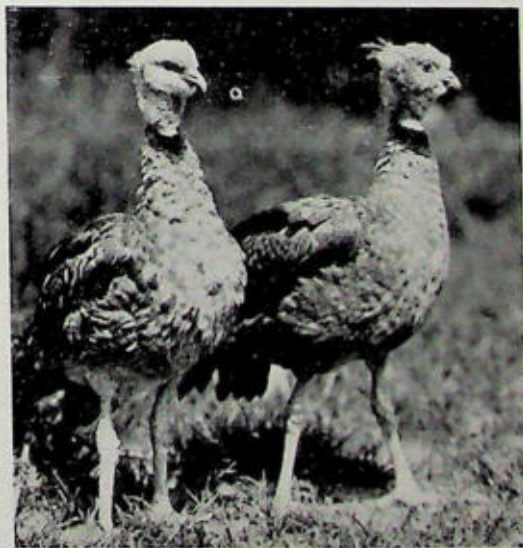
as possible and fly nervously to and fro apparently impelled more by curiosity than by fear. Their harsh voices are grating enough taken singly but when twenty-five or thirty screech simultaneously they make a din that can be equalled by nothing but another similar flock of parrots.

It is of more than passing interest to note that of the hundreds of kinds or species of parrots in the world this is the only one that makes a nest. All the others nest in holes in trees, and with the exception of two small South African species, do not even put any lining in the bottom of the hole. It sometimes happens that some of the compartments of these large parrot nests are occupied by things other than parrots while the remainder are used by their rightful owners. Tree ducks and even opossums have been found in some of these nests. The parrots use the same nests year after year, adding new ones from time to time as the old ones deteriorate.

Five or six miles inland from the eastern shore of the island the vegetation changes suddenly; the trees and shrubs disappear and we find ourselves in a vast swamp of giant grasses and reeds. The bird life changes also. The kingfishers are now left behind and our attention at once centers on a new and highly attractive little bird, the swallow-like tyrant⁹. This little flycatcher, black and white above and white below, is entirely a bird of the edges of streams and is never found away from water. It builds a beautiful purse-shaped nest which

it attaches vertically to reeds or small twigs standing directly at the water's edge. Its ceaseless activity, pursuing its insect prey in true flycatcher fashion, its dainty coloring, the suddenness with which we come upon its habitat and their abundance in that habitat all serve to make this bird unusually interesting and to win for it a place in our feelings that is denied to most birds.

In this vast marsh are numerous lagoons of all sizes and shapes, usually with some dead trees sticking up here and there supporting groups of cormorants¹⁰ or frequently bare except when a Carancho¹¹ alights for a rest. On



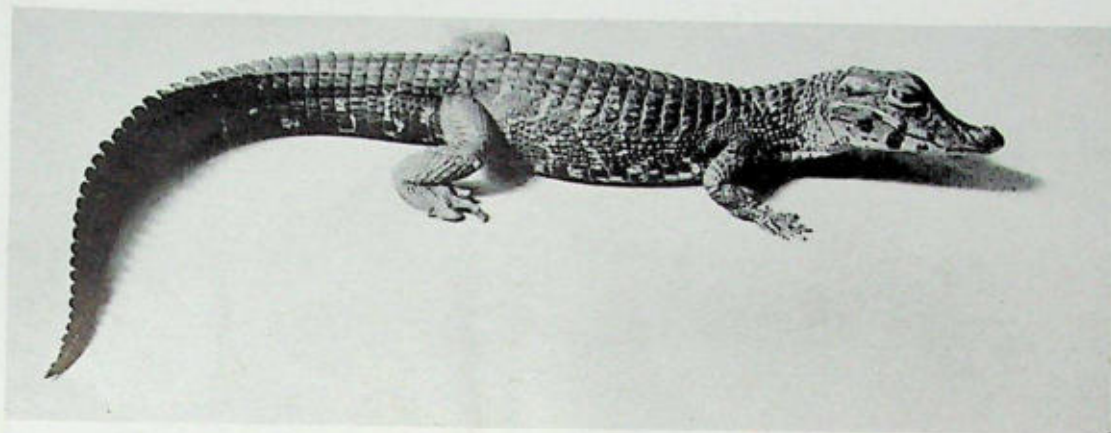
CRESTED SCREAMERS

"The bird of greatest interest in these marshes is the screamer."

⁹*Fluvicola albiventer* (Spix.).

¹⁰*Phalacrocorax vigua*.

¹¹*Polyborus plancus* (Miller).



A YOUNG CAIMAN

"The Caiman, which replaces the alligator in South America, looks very much like the latter and is exceedingly common in these islands."

a long sand bank running across one of these lagoons we may see a flock of several hundred terns closely massed on the glistening sand while off in the reed-bordered background a pair of crested screamers¹² may be noted. The Guaraní Indians named these screamers Chajá and this name is still the common local name of the bird for it sounds just like their call.

As we approach the screamers leave with loud cries of "Chajá, chajá" while the terns¹³ all rise making the blue sky sparkle with white and their harsh shrill screams recall other similar flocks on much more stormy beaches in North America. There is something strange about the screams of terns. The sound harmonizes so

well with the low rumble of the surf that it seems out of place here in a calm, mirror-like, sub-tropical lagoon.

Coots,¹⁴ quite similar to our coot, flush from the reeds, and jacanas¹⁵ walk daintily among the floating vegetation every once in a while raising their wings and exhibiting the delicate green of their flight feathers. Lapwings¹⁶ and stilts¹⁷ walk about in open places and the orange-headed blackbirds¹⁸ come down to drink as we leave.

But the bird that stands out above all others in these marshes in point of interest is the crested screamer. These birds, about the size of a turkey, are always found in pairs. Even when in flocks the birds are paired off and their stately, watchful pose makes them seem the special guardians of the marsh, the sentinels of the swamp. They are exceedingly shy except after the breeding season is well over, and even then they are by no means tame. However, in winter they go in large flocks and are less suspicious. The screamers build large nests on the ground in wet places building up until the nest is well over the surface of the water. The eggs are white and without spots. Apparently two broods are raised as they nest in September and October and again in January according to reports. If caught when young they are easily tamed and serve as ex-



NEST OF A CAIMAN

"Often several females lay in one nest, which is merely a pile of dead and decayed vegetation."

¹²*Chauna torquata* (Oken).

¹³*Phaetusa chloropoda* (Vieill.). *Sternula superciliaris* (Vieill.). *Sterna trudauai* (Audubon.).

¹⁴Chiefly *Fulica leucoptera* (Vieill.), but also some *Fulica rufifrons* (Phil. et Landb.).

¹⁵*Jacana jacana* (Linn.).

¹⁶*Belonopterus cayennensis griseus* (Prazak).

¹⁷*Himantopus melanurus* (Vieill.).

¹⁸*Amblyramphus holosericeus* (Scop.).



COCCOI HERONS IN THE ZOOLOGICAL PARK

"Mingled with the other birds were numbers of these wonderful Herons."



A LAGOON IN THE ISLAND

The flowering water plants are solid masses of water hyacinths.

cellent watch dogs. Armed with two heavy spurs on each wing, they are quite formidable foes and command the respect of most dogs and many men.

The screamers are interesting from all points of view. Anatomically they show one feature wherein they differ from all other living birds,

—namely that the ribs are devoid of uncinat processes; those little side projections on the ribs of other birds. In this respect they agree with the oldest known fossil bird, the Archaeopteryx and in fact Huxley thought the screamers traced their descent back to this ancient type.

Among the other inhabitants of these marshes are many large birds of striking appearance. The largest of these is the Maguari stork,¹⁹ a huge white bird with black flight feathers and brick red legs and bill. Wood ibises²⁰ identical with our bird of the southern states occur in large numbers and mixed with them are smaller numbers of egrets,²¹ Cocoi herons,²² and roseate spoonbills.²³ Two varieties of small ibises²⁴ are very common here, often flying over in flocks of eight or nine hundred birds.

Another strange creature is the Ypecaha Rail²⁵ which is the largest rail in the world and has the very un-rail-like habit of roosting in trees. The soft olive green of its back, the vinous chestnut of its underparts, the pale ashy-blue on its head, and the light green of its bill make this bird one of the handsomest of the marsh birds. They nest on the floor of the marsh among the thick growths of reed and giant grass, just as do our local rails in the cat-tail marshes at home. Beyond doubt these



THE AMERICAN EGRET

"Among the inhabitants of these marshes are many birds of striking appearance."

¹⁹*Euzenura maguari* (Gm.).

²⁰*Tantalus americanus* (Linn.).

²¹*Casmerodius albus egretta* (Gm.).

²²*Ardea cocoi* (Linn.).

²³*Ajaia ajaja* (Linn.).

²⁴*Phimosus nudifons azarae* (Berl. et Hart.), and *Plegadis guarauna* (Linn.).

²⁵*Aramides ypacaha* (Vieill.).



THE IGUANA AND SMALL GREEN LIZARDS AROUND

"The herpetologist would find this region a paradise for study."

marshes still hold unknown animals of all groups, from birds or reptiles to the lowliest forms of invertebrate organisms; but the known contents are sufficient to provide study for years.

A herpetologist would find this region a paradise for his branch of study. Crushing anacondas, venomous bush-masters, rattlesnakes, harmless species of small size, the huge caiman, the iguana and small greenish lizards are abundant, while innumerable logs provide basking space for the turtles that flourish here in good numbers. The giant toad is common and other batrachians lend their voices to the chorus of an Argentine night.

The fishes have never been studied and a rich harvest awaits the ichthyologist who comes

to these islands. The Paraná forms a natural highway for the wanderings of animals of all kinds between Brazil, Paraguay, and Argentina, and consequently the valley of this river is a rich field for the naturalist. As settlements increase and spread on the mainland on either side the larger, shyer, and rarer animals, particularly birds and reptiles, either take refuge on these islands or else are greatly reduced elsewhere. The inaccessible swamps of islands are in reality great natural game preserves, although in this case the game is more particularly avian and reptilian than mammalian in character. These islands have what amounts to a concentrated fauna and still possess in abundance many forms which are becoming scarce elsewhere. The appeal of these islands to a naturalist is irresistible.



SOME SOUTH AMERICAN TOADS

"The giant toad is common, and other batrachians lend their voices to the chorus of an Argentine night."



A WILD COLUMBIAN BLACK-TAILED DEER, AT PARADISE INN, PARADISE VALLEY,
RAINIER NATIONAL PARK

It went to bed in a tent near the hotel while the occupant was away, and was thus photographed by the tentkeeper.

THE DEER THAT WENT TO BED IN A TENT

WE have heard much of the acceptance of man's protection and friendship, but the story and photograph sent from Paradise Inn, Mount Rainier Park, by Mrs. L. H. Porter, of Stamford, Conn., certainly furnish "the last word" in that line of manifestations. Mrs. Porter's letter charmingly tells the whole story; and we send our compliments to the man who was so quick on the draw that he succeeded in getting this record-breaking picture.

"Aug. 28, 1924.

"My dear Mr. Hornaday,—

"I am mailing you today a curious photograph. Here at Mt. Rainier there is a year-old

deer, which last summer as a little fawn came freely around the hotel from the woods. This summer it came back and has haunted the hotel, fearlessly. Finding the great front door open, it strolled in the first day it was here, walked up to the gushing little drinking fountain here in the big foyer—and took a drink,—to the speechless amazement of employees and guests! Since then it is here freely, petted by every one; and two weeks ago one of the employees entered an empty tent to make it up for a coming guest and found the deer as you see him in the picture. He (the man, *not* the deer) flew to the hotel, snatched up a camera, and took the picture. It was enlarged later, I believe, but anyway it is a bona fide incident. Don't you think it is, to say the least, unusual?

Hastily,
(Mrs.) E. M. PORTER."

New York Zoological Society



OBJECTS OF THE SOCIETY

☞ A PUBLIC ZOOLOGICAL PARK. ☞ A PUBLIC AQUARIUM. ☞ THE PRESERVATION OF OUR NATIVE ANIMALS. ☞ THE PROMOTION OF ZOOLOGY.

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ELWIN R. SANDOZ, Editor

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<i>Birds</i>	<i>Reptiles</i>
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WILLIAM BEFFER,	

Director of Tropical Research and Honorary Curator, Birds

Each author is responsible for the scientific accuracy and the proof reading of his contribution.

VOL. XXVII SEPTEMBER, 1924 No. 5

VISIT FROM CAPT. CALDWELL, NOTED GAME PROTECTOR FROM AFRICA

Among the notable arrivals at New York early in July was Captain Keith Caldwell, formerly Aide to Lord Northey, Governor of Kenya Province (British East Africa), but more recently the chief executive officer of the Game Department of that Province. He visited America as the guest of Don A. Baxter, of Stamford, Connecticut, who last year made an extended hunting trip north and south of Nairobi, and killed African big game so sparingly as to attract the attention of the Chief Game Protector.

Captain Caldwell is a game protector who really protects game, literally without fear and without favor, whose judgment is correct and just, and whose energy and initiative are, to say the least, unusual. While thoroughly in sympathy with the rights of bona fide settlers to reasonable protection against marauding herds of game, at the same time he demands the friendly co-operation of settlers in preventing wasteful and unnecessary slaughter.

Thanks to the wise and determined policy of the Kenya government, the elephant-hunting situation is now on a sensible basis, and well in hand. Under existing regulations, the elephants of Kenya are not going to be exterminated in the near future. No elephants can be killed without a government permit costing \$75, and no small tusks may be exported, or sold.

Captain Caldwell and Mr. Baxter visited the Zoological Park, the American Museum of Natural History, the New York Aquarium, the Philadelphia Zoo, and Washington and Detroit.

DEATH OF J. WYNN CULLEN

The members of the Society and the Staff of the Zoological Park have learned with regret of the death of J. Wynn Cullen, Superintendent of the Municipal Zoo in Memphis, Tennessee.

Mr. Cullen visited the Park several times in his quests for specimens, and it was during these trips that we became acquainted with this very genial and kindly man.

The shocking manner of his death and the members of his immediate family is described in the following item from the *New York World*:

"Memphis, Tenn., July 27.—J. Wynn Cullen, Superintendent of the Memphis Municipal Zoo, his wife, young son and his brother were drowned today in the Mississippi River, twenty-five miles from Memphis. The Cullen family had gone up the river for an outing and went in bathing. Mr. Cullen, with his son, John, six, on his shoulder, stepped into deep water. Mrs. Cullen and Hugh, the brother, jumped to the rescue."

MOOSE ON ISLE ROYALE, LAKE SUPERIOR

A MOST INTERESTING RECORD

The *News-Herald*,
Franklin, Pa., June 17, 1924.

Dr. William T. Hornaday,
Zoological Park,
New York City.

Dear Sir:—I have been reading your articles about American animals in the *Youth's Companion* with great interest but last night from your article concerning the moose I seem to discover that you are unacquainted with the magnificent moose herd living on Michigan's big wilderness island, Isle Royale.

The origin of that herd is a mystery. Com-

paratively a few years ago there seemed to be no moose there, but they have so increased in numbers within recent years that I find them like range cattle, all over the island.

It is a difficult thing to estimate numbers in such a case, but the game warden, who is the island's only permanent human inhabitant, thinks there must be well toward two thousand of them. And the huge yards which they tread down in a half dozen places make me believe that he is not far from correct. The island is almost ideal moose country, with no end of feed.

I have never seen the Alaska moose, but some of these moose on Isle Royale impress me as about the finest specimens that could be imagined. I have spent my summer vacations on the island for many years now, and I frequently meet these big fellows at close quarters. They walk into my camp at night and smell of my tent.

Very truly yours,

WILLIAM P. F. FERGUSON, *Editor.*

THE NINTH EXPEDITION OF THE ZOOLOGICAL SOCIETY

Following the preliminary announcement made a year ago in the Annual Report, the next

expedition will be an Oceanographic one, of deep sea exploration, under the directorship of William Beebe. Henry D. Whiton, a member of the Executive Committee, has presented the Society with a thirty-six hundred ton steamer for a six months' trip through the Sargasso Sea and along the West coast of Africa. The steamer, which will be called the ARCTURUS, is two hundred and eighty feet long. Mr. Beebe's usual staff of artists, photographers and scientists will be supplemented by an additional corps of scientific workers. A laboratory will be built on board and every facility provided for research work.

The chief objects of the expedition will be the study of the habits, adaptations and development of the strange fish which inhabit the depths of the sea, and the acquisition of a collection of live African animals for the Zoological Park and fish for the Aquarium.

CAUCASIA TO PRESERVE BISON

Moscow, June 13.—About 200,000 acres in western Caucasia, where the aurochs or European bison still survive, have been declared a national preserve. The purpose is to afford these animals adequate protection.—*The Sun*, New York.

THE MUD-SUCKING PLATYPUS: A BRIEF HISTORY.

By HARRY BURRELL.

From the *Australian Museum Magazine*.

Mr. Burrell, who is widely known as one of the foremost field naturalists in Australia has for years made a close study of the platypus and its habits. In the following verses he has summarized the salient characters of this strange survival from the geologic past.—EDITOR A. M. M.

O! thou prehistoric link,
Kin to beaver, rooster, skink,
Duck, mole, adder, monkey, fox,
Palaeozoic paradox!

Beak of shoveller, spur of fowl;
Cheek of monkey (pocket jowl);
Trowel of beaver, gait of skink;
Dope of adder, foxy stink.

Mode of digging *a la* mole,
Fur much richer on the whole;
Feet palmated, ditto paws;
Latter webbed beyond the claws.

Swimming, diving, most expert,
Wary, nervous, cute, alert.
Food—aquatic creatures (small),
Sediment, and mud with all.

Ear and eye-lids all in one;
Young have true teeth, adults none;
Snarls like cheeky pups at play;
Bites like gander when at bay.

Adult female spurless quite;
Teatless udder—contents white;
Egg producing, capsules soft;
One to three, but two more oft.

Epipubic bones support
Dimpled abdomen; in short,
In that slight depression she
Incubates her progeny.

Warmth increased for eggs and young
By her tail, well underslung;
Snugly cuddled to her breast.
Mother nature does the rest.

Day-old youngsters in the nude,
Beakless, sightless, contour crude;
Sleep essential, rapid growth.
Spurs project in sexes both.

Mother's duties never done;
Father's (when not flirting)—none;
Hail! O paradox supreme,
Prehistoric Monotreme!



DEPARTMENT OF
TROPICAL RESEARCH
OF THE
ZOOLOGICAL SOCIETY

Contribution Number 179



THE RAREST OF NESTS ON THE TALLEST OF GRASS STEMS

By WILLIAM BEEBE

Photographs by Herman Rogers and John Tee-Van

ONE of the first days of the present season at Kartabo served to bring forcibly to mind the inexhaustible and unexpected qualities of animal life in the tropics.

Nearly the rarest and quite the most beautiful of birds in our quarter mile of jungle is the Pompadour Cotinga, *Xipholena punicea*. It is closely related to the Bellbird, Cock-of-the-Rock, Umbrellabird and Calfbird, and like all of them is supremely individualistic in appearance. The female is a dull earthen-brown, but the male is a glory of claret-red and dazzling white, like wine splashed on snow, as RUTA ROSE aptly said. The simile is heightened by the elongated greater wing-coverts, which are stiff, and curve across the pure white flight feathers like trickles of purple liquid.

The Pompadour Cotinga is a bird of the veriest tree-tops, often so high that I cannot be sure of its identity until I have shot it. Its note however, is unmistakable, a sudden loud, ventriloquial, frog-like, rattling croak. The sound seems to come from no direction whatever, and, until the bird flies, is no clue to its whereabouts. Until I had seen the bird utter it, I presumed it only another weird voice of some of the giant, jungle tree-frogs.

As far as I know, its nest and eggs are quite unknown, and full-sized young males still in female plumage are the only clues I have had to their development. I have thought of the nest as being probably placed high up in the tallest trees where the birds themselves love to perch and to feed on the green-skinned berries which seem to form their entire diet.

Hardly had our trunks and cases been unpacked and tents erected in our Kartabo compound when I was called to see a dove sitting on its nest high up on a bamboo stem which slanted almost over the laboratory roof. A casual glance seemed to confirm the news but

something unusual led me to mount my number twelve glasses on a tripod and instantly there swung into perfect focus a female Pompadour Cotinga sitting on the smallest of nests. She was at least sixty feet up, but every feather, and even the color of her iris, was visible. More than this, I could actually distinguish the egg showing through the meagre snarl of tendrils which composed the nest. This rarest of birds choosing its home at our door step brought to mind Maeterlinck's "Bluebird".

When the bird flew off for short intervals the shape and even the pattern of the egg became distinct; when she returned and settled down, the entire nest was eclipsed by the feathers of her breast.

For two days a Ways and Means Committee, made up of all of us, discussed methods of obtaining this precious addition to ornithological lore; it was tantalizingly near, yet to collect it was no easy matter. An egg miraculously balanced at the extreme tip of a giant blade is not to be casually picked off. Mr. Merriam, upon whom we have learned to rely in situations demanding mechanical ingenuity, took small part in these discussions and heated arguments, but the steady sound of ax, hammer and saw told us that he was devoting his time to some practical, rather than theoretical, method of egg-collecting. He presently produced a bamboo pole long enough to reach the nest and light enough to handle, with a wide, shallow net suspended and dangling loosely from its tip.

The full strength of the company assembled in the compound when preparations had been completed for the assault on the aerial fortress of *Xipholena*. Some of us raised the pole to bring the net close under the nest, in itself sufficiently difficult, as a sixty-foot pole of even the lightest wood is an unwieldy affair. Two other ardent collectors climbed to the roof of



FEMALE POMPADOUR COTINGA ON HER NEST.

the laboratory to give what aid and comfort they could to me, who in turn swarmed up the nest bamboo itself until it bent perilously. Testing it again and again I crept slowly upward until I heard alarming groans and cracklings from the base of the giant grass stem. A few feet farther, and then I knew that another yard would probably precipitate both the egg and myself to the ground, in no condition either to be preserved in an egg collection or to continue the scientific work of the Zoological Society.

I then began to sway the great stem to which I clung slowly from side to side, while the audience on the ground watched breathlessly, for the chances seemed more than good that I would make a Cotinga omelette. Presently the precious egg rolled out and dropped gently an inch or two into the waiting net. The situation was then somewhat like that of the man who had the bear by the tail. The egg was undoubtedly in our possession but what were we going to do next? To lower the pole all the way to the ground was impossible, the risk that the shallow net would not remain horizontal being too great. Here the enthusiasts on the roof took their part. There were anxious moments while the pole was slowly slanted in their direction until one of them, straddling the ridge-pole and stretching upward at full arms'-length, could

reach our invaluable specimen, and, following the plan that every small boy and ornithologist knows, place it in his mouth for safe-keeping. His descent from the roof was watched with a tender solicitude that he has never known before or since, while imploring voices besought him not to speak or laugh, and above all not to swallow! He accomplished the journey in safety and we were in triumphant possession of the first Pompadour Cotinga's egg known to science.

The bird had been secured before the attempt on the nest commenced, and to get the nest was a comparatively easy matter. It seemed like a good omen for the season's work.

This nest and egg of *Xipholena punicea* is Number 270 in the list of the nests taken in the quarter square mile of jungle which we are studying at Kartabo. It was taken on March 6th, 1924. The egg weighed 7.9 grams and it measured 30.8 by 22.2 millimetres. The female parent weighed 69.3 grams, so the egg was nearly one-twelfth of her weight.

The egg was an unusually broad, blunt-ended oval, with a ground color of very pale, light greenish grey, thickly spotted and blotched with intermingling patches of drab. While the entire egg was thus covered, the markings were denser and more confluent at the larger end.

The nest was in a small nodal crotch at the



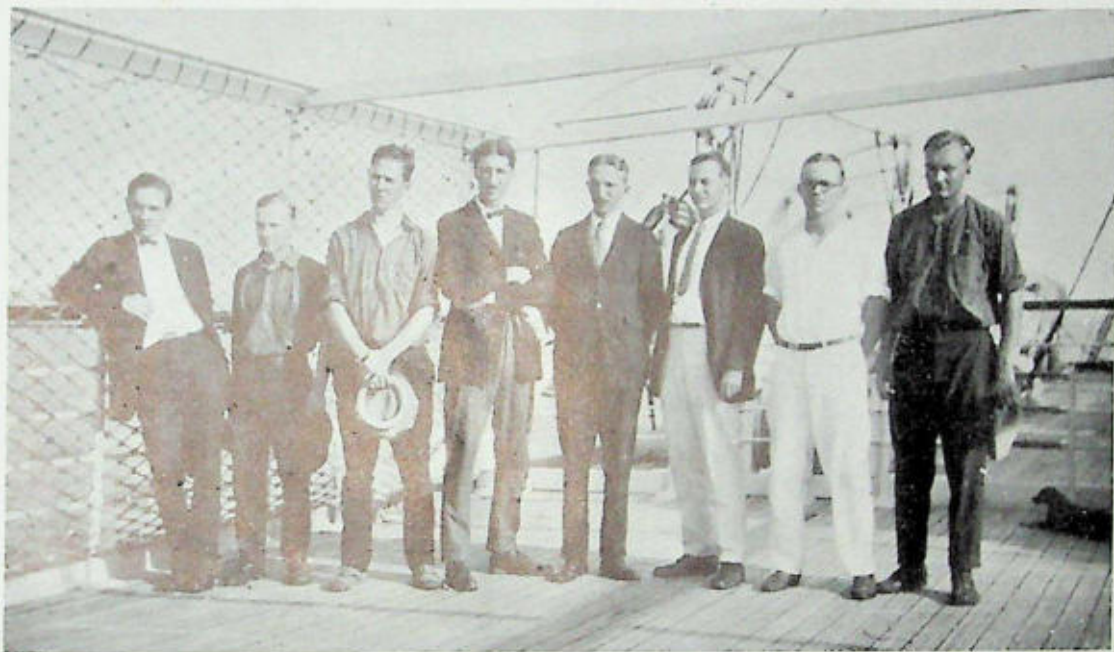
NEST AND EGG OF THE POMPADOUR COTINGA.



POMPADOUR COTINGA ON HER NEST
From a water color drawing by Helen Tee-Van

junction of two joints of bamboo about sixty feet up a full-grown stem. It consisted solely of a very open, loose tangle of six or eight bits of slender, curly, woody tendrils, forming a

deep cup just large enough to hold the egg. The open character of this flimsy nest permitted the egg to be visible below as well as above.



GRADUATE STUDENTS FROM THE UNIVERSITY OF PITTSBURGH

These students, under the direction of Prof. Alfred Emerson, are spending two months at the Research Station upon their doctorate degrees.

EIGHTH EXPEDITION OF THE DEPARTMENT OF TROPICAL RESEARCH

THE eighth expedition of the Zoological Society left New York on February 11th on the steamship "Mayaro", with a staff of twelve and, and opened the laboratory at Kar-tabo, British Guiana, on February 29th. It returned to New York on July 21st.

The staff consisted of the following persons:

WILLIAM BEEBE, Director
ALFRED EMERSON, Assistant Director
JOHN TEE-VAN, Research Asst. and Cinematographer
WILLIAM MERRIAM, Assistant in Field Work
HAROLD TAPPIN, Assistant in Entomology
HERMAN ROGERS, Assistant in Photography
HARRY HOFFMAN, Artist
ISABEL COOPER, Scientific Artist
HELEN TEE-VAN, Assistant Scientific Artist
RUTH ROSE, Historian and Technician
KATHERINE ROGERS, Assistant Microscopist
SERGE CHETYRKIN, Assistant Field Naturalist

The season was prolific of results and many new discoveries were made. The quarter square

mile of jungle seemed as inexhaustible as ever, and is as full of animal life from insects to monkeys as before research work was begun six years ago. The work of the Director on the general environment and ecology of the region was rounded out and will be published this autumn.

When we left the Station our place was at once taken by eight graduate students from the University of Pittsburgh who, under the direction of Prof. Alfred Emerson are spending two months in research upon their doctorate degrees. This educational phase of the work of the department seems most important and sets a record as the first class ever sent out by any university for actual work in an inland tropical jungle. The cooperation and help of the British Guiana government, both in our case and that of the students, was as usual cordial and whole-hearted.

Two facts show rather vividly the interest that the public at large is taking in the exploration work of the Zoological Society; during August the Society's volume "Galápagos;

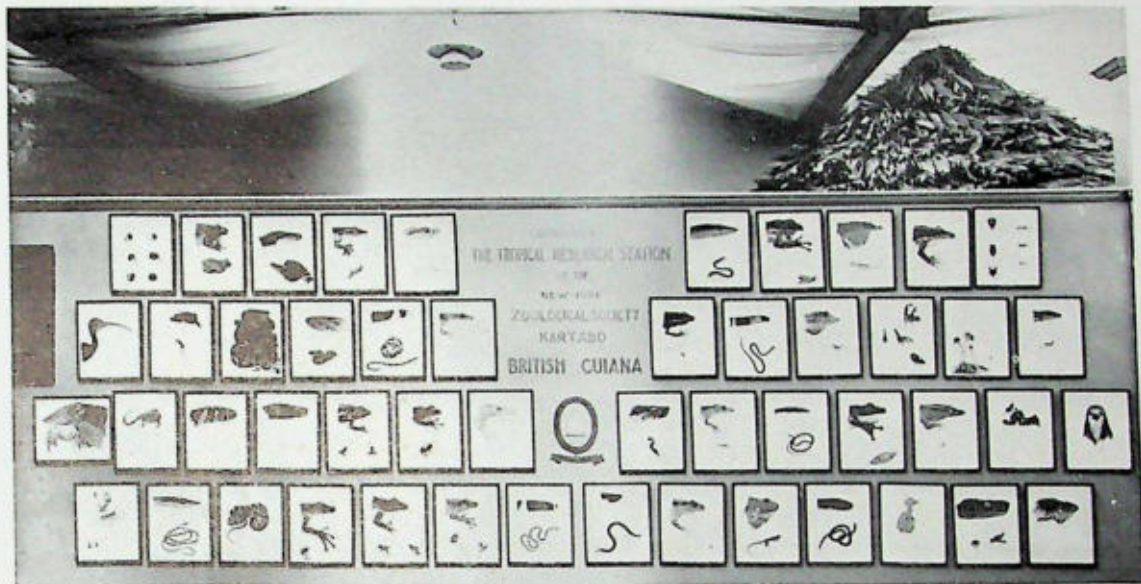


EXHIBIT OF THE TROPICAL RESEARCH STATION, WEMBLY, ENGLAND

This photograph, of fifty paintings by Isabel Cooper, is shown through the courtesy of Brig. Gen. C. E. Rice, Commissioner of the British Guiana Section.

World's End" has risen from ninth to sixth place in the list of best sellers of non-fiction, and a request has just been received and granted to transcribe the book into Braille for the blind.

EXHIBIT OF THE TROPICAL RESEARCH STATION AT WEMBLY, ENGLAND

Contribution Number 180

By WILLIAM BEEBE.

GRATITUDE is defined as a warm and friendly feeling in response to favors received, and while we of the Tropical Research Station are never without this sentiment toward the Government of British Guiana, it is seldom that we can manifest it through material channels. Hence it was with real enthusiasm that I responded to the Governor's request that we send to the great Empire Exhibition at Wembley some representation of the animal life of the only British Colony in South America. This took the form of fifty of Miss Isabel Cooper's paintings selected from the hundreds which she has executed at the Research Station at Kartabo. With the hearty approval of the Zoological Society I had these framed and shipped to England in time for the opening of the Exhibition, and the numerous letters I have received indicate that they have well fulfilled their purpose.

By the courtesy of Brig.-Gen. C. E. Rice, Commissioner of the British Guiana Section, I am able to show a photograph of the Exhibit of the Zoological Society.

A LIVE GIANT ARMADILLO AT LAST

Contribution Number 181

By WILLIAM BEEBE

JUST two years ago in the pages of the ZOOLOGICAL SOCIETY BULLETIN I made the following prophecy, "Now that the Giant Armadillo is no longer a mystery, and we have photographed and dissected it, the next thing is to capture one alive. And although out of such fuel as grubs and worms and ants it develops claws like scythes, backed with a full horsepower of force, there is somewhere the Armadillo and somehow the method, and this last survivor of the age of mammoth anteaters will, sooner or later, be on exhibition in our Zoological Park."

On August twenty-eighth of the present year this prophecy was fulfilled and there arrived at the Zoological Park from the Tropical Research Station the first living Giant Armadillo which has ever been exhibited in captivity. The animal is a young one, in good condition. It would seem, as in the case of gorillas, that only the young of this species could be captured alive, for the adult has such tremendous strength and



THE GIANT ARMADILLO AT KARTABO

He was a rather clumsy walker, but as a burrower he was exceedingly expert.

punishing claws that to overcome it without injury either to the men or the animal would be exceedingly difficult. The creature was brought to the Station by an Indian hunter and purchased under the impression that it was one of the two common species. With this thought still in mind it was turned loose for the eight students of the University of Pittsburgh to study and to photograph. When at last Dr. Emerson realized what a prize had fallen into his hands, the Armadillo was caged behind the strongest of wire and fed and watched with sedulous attention.

This phase of the adventure is best told in Dr. Emerson's own words in a letter sent me from Kartabo:

"Luckily we had two days of photographing the Giant Armadillo with movies and graflex before we knew what we had. When you see these pictures you will shudder at the chances we took of letting it slip. Of course we wanted

natural pictures, so we had it running around loose and photographed it digging. I let it get in halfway and would then try to pull it out. This could not be done in the soil in front of the bungalow which, as you know, is full of roots. Even in the sand of the beach, when it got completely into a hole I pulled on its tail with all my strength and could not get it out alone. I pulled so hard that there seemed a real danger of pulling the tail off, but let me again remind you that we thought we had an ordinary armadillo. We then put it into the water to watch it swim and it swam on the bottom instead of the top and after waiting for it to come up for several minutes we hauled it out. It was not drowned but can you imagine my doing this if I knew what I had! We then put it on the board leading out to the stelling and let it walk alone. It was rather clumsy and once it got to the edge and fell off two feet on its nose in the sand. Of course we were letting



When he had fully burrowed in a hole it was impossible to pull him out without help.



The sturdy character of the huge front claws is ample evidence of his ability to burrow.



A YOUNG GIANT ARMADILLO

Even at this stage of growth, one is impressed by the massive structure of this rare specimen.

it walk all over the place and taking movies with all of us some distance away. Think of this and then recall the hard chasing we had to do one year when an armadillo decided to run! By this time you may have given up all hope of getting the beast home alive, but let me at least reassure you by telling you that she is still healthy and seems no worse for her rough treatment, and we shall be very careful in the future to take no chances. In a way it was fortunate that we did not know she was a Giant, because as a result of our relaxed carelessness we have some good stills of her digging and walking, and movies of such unscientific feats as falling on her nose and of me hauling her out of the ground or at least trying to do so. We are taking as complete a series of observations as possible, and these will probably be of value, as, from your accounts of the rarity of the species, little has been recorded of its habits."

I have asked Dr. Emerson to write an account of his observations of this living Giant Armadillo for a future number of the *ZOOLOGICAL SOCIETY BULLETIN*. The photographs in this article were taken by Mr. Hugh Raup and W. A. Myers.

KARTABO NOTES

Contribution Number 182

By RUTH ROSE

AFTER four busy months at the Tropical Research Station at Kartabo, it is interesting to recall some of the incidents and adventures from among the many happenings that filled our days. Each member of the party has his special interest, but each finds the researches of the others very distracting, and in the midst of so many occurrences, concentration is most difficult. When one should be utterly absorbed in the identification of a new species of fish, and an enthusiast in another line rushes in with a six-foot snake of the most venomous kind, even Isaak Walton might feel slightly distracted from the business in hand. On a solitary walk in the jungle it is much the same story; the attention so often ricochets from the object at which it was first directed, to one which in turn presents a hundred facets to the speculative eye.

This year's expedition began most propitiously with the discovery of the cotinga's nest, of which a detailed account will be found in this number of the *BULLETIN*. Nothing could have been more surprising than to find in our own front yard, the nest and egg of a rare bird whose breeding habits were entirely unknown, but which was supposed to nest, even as it lived



MISS ROSE AND THE PORCUPINE

While assisting in the photographing of a prehensile tailed porcupine, it was learned that porcupines could be stroked in one way only.

the rest of its life, in the tops of the tallest trees of the densest jungle. However, in our jungle laboratory it is always the unexpected that happens. For instance, Dr. Emerson, who has for some years made a special study of the termites of Kartabo, was making some observations this season on one of the huge termite nests that are so common round about the Station. Deep in its heart he found the eggs of a tegu. This tegu is a large lizard, tigerishly striped with black and yellow. The natives call him *Salimpenta*, and say that he digs into fresh graves and there feasts ghoulishly. However that may be, we know that he is a jungle scavenger and that he often takes the bait we expose for other animals. He is a wary beast, and the sudden explosion of sound that he makes as he rushes to safety through the underbrush is worthy of a much larger creature.

One of the four eggs was opened and found to contain a large embryo, and as we had never had a young tegu, a cage of netting was built all round the home of the "wood ants" to prevent the escape of the other lizards when hatched. Weeks passed and we had almost decided that the remaining eggs had spoiled, when a newly hatched tegu was found scrabbling at the wire in a most annoyed fashion. He was secured and brought in for Miss Cooper to paint, as she had already painted the adult and the embryo. At the same time the Director brought in another egg, whose contents he proposed to examine and then preserve. He was busily engaged in puncturing one end of the leathery shell, when the other end suddenly burst open and a very active young lizard ex-

ploded into his lap, rushed up the front of his shirt and leapt to his desk. The lizard's feelings we can only guess; there was certainly never a more startled man, and his involuntary shout of astonishment brought everyone within hearing to what they thought might be the rescue.

Our list of excitements is a catholic one, ranging from some of Dr. Emerson's observations of termites and their microscopic beetle guests, to a black jaguarondi that the Director secured a few yards from the laboratory. The river in front of the bungalow yields strange fish for Mr. Tee-Van's study, as well as a variety of their queer crustacean parasites which our servants call "the fishes' cockroaches". Contact with an electric eel now and then provides a not unpleasant shock during our daily swim in the broad stream, and the occasional capture of a sting-ray or fierce little perai reminds us that there is a certain spice of danger to be found there. Recently a dissected perai was found to contain a dog's tail, and ever since we have made earnest but unsuccessful investigations among the neighboring Indians, hoping to find among their hunting dogs, a mutilated canine to match this interesting relic.

Mr. Tappin's special study, that of the lepidoptera of Kartabo, has provided us with some interesting chapters for our laboratory chronicles. He has concentrated particularly upon obtaining the life-histories, with entire success in a very satisfactory number of cases. The astonishing shapes and colors of the caterpillars, and their incredible changes from one larval stage to another have been constant sources



NEST OF A TEGU

Dr. Emerson while exploring a termite nest unearthed the nest of a tegu in which were four eggs.



REFRACTORY PETS

Miss Rose with two porcupines collected for the Zoological Park.

of surprise. Complete descriptions of the delicate egg, of each succeeding instar, to the final beauty of the adult insect, all this in many instances illustrated with colored plates by Mrs. Tee-Van, make valuable records of some hitherto unknown facts.

A green caterpillar, armed with a pair of enormous, forward-curving horns, which at once earned him the name of the Texas Steer, ate in the industriously concentrated fashion of caterpillars for some days, and suddenly became a hornless and perfectly unrecognizable creature. A Sphinx caterpillar was found hanging upside down from a twig, drawing back his head under a hood which was so marked as to give a perfect imitation of a snake, even to the eyes. Thus masked, we must presume that the caterpillar deceives and even terrifies certain enemies that would otherwise devour him. Indeed, his disguise is so good as to startle anyone at first, or even second glance.

A native hunter in our employ, one of the few whom we have been able to induce to capture snakes alive, brought us one day the largest fer-de-lance ever secured at Kartabo, of which

Miss Cooper made a beautiful plate. At the same time he produced a vial, and explained that an hour earlier he had put in it "a worm".

"Now look," he concluded disgustedly, and exhibited a golden chrysalid, a potential butterfly clad in enchanted knight's armor of purest gold leaf, finely inscribed with cryptograms of black. As an example of the goldsmith's art it was admirable; as a pupa it was quite incredible. Cellini might have made it, a Valois or a Medici might have worn it, and the man who brought it was merely annoyed because the "worm" he had captured seemed to have played a trick on him.

We watched and admired for days, speculating on what would emerge from this marvellous sheath. At last the shining surface began to darken; the chrysalid split open and a Danaid crept forth, a reversed alchemy having transmuted pure brilliant gold into a glory of delicate scales, black, yellow and orange.

No record, however brief, of the past year would be complete without mention of Mr. Chetyrkin, a new Russian member of the staff. Even in this time of refugees, when we have become almost accustomed to countesses turned waitress and dukes teaching calisthenics, his adventures, in a country turned topsy-turvy overnight, are sufficiently remarkable to make an Odyssey,—or a movie. Perhaps they are made doubly interesting by the labor necessary to extract them from him, on the principle that the things for which one works hardest, one values most. The obstacle was not that of diffidence but of language. He spoke almost no English, and his favorite words were "very much" and "finish"; no one who has not tried can imagine the number of situations where this meagre vocabulary will be found expressive and appropriate. Listening to his stories of adventures among the Bolsheviks held all the fascination of delving into an exciting, but almost undecipherable manuscript, filling in from the imagination a missing phrase, or guessing the meaning of an eloquent gesture when words were lacking.

In Russia an archaeologist and botanist of repute, leader of scientific expeditions into Tibet and Turkestan, author of several books dealing with his researches and explorations, he escaped from his country during its most nightmarish period, and finally reached New York by way of Constantinople. Here, in spite of his attainments, he could find no work except very poorly-paid positions, largely, of course, because of the



ASCENDING A JUNGLE TREE

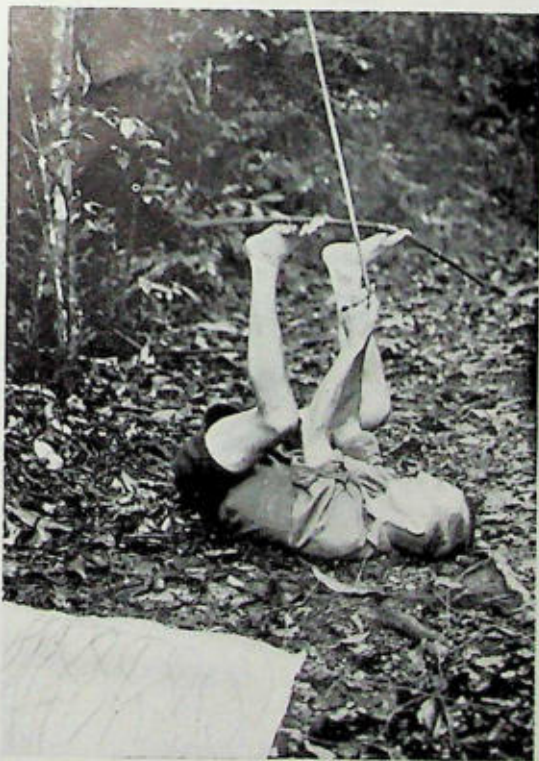
To the small cord carried aloft by the arrow was fastened a heavy rope to which was attached a boatswain's chair.

barrier of language, and he was having a struggle to exist when Mr. Beebe heard of him and, aided by the generosity of Mr. B. Preston Clark, took him on the eighth expedition of the Tropical Research Station. He proved a valuable addition to the staff, for he made beautiful skins of birds and mammals, collected and mounted thousands of insects, preserved fish, and showed us a method of mounting snake-skins which largely preserves their original colors. His eagerness and good-will were unflagging; in fact, his enthusiasm was so uncontrollable that at times he actually imperilled his health in his anxiety to do his utmost.

We brought a few live animals back to the Zoological Park, among them a monkey or two, of course. Kartabo would be unthinkable without at least one pet monkey to delight us with his mischievous humors and temperamental outbursts. Two tree porcupines, with bright yellow, invincibly sharp quills, thrived in our society. Like the skunk, though for a different reason, they are placidly sure of themselves, and even submit to discreet, with-the-grain stroking. On one occasion I came to grief through too

great familiarity with one of these thoroughly armed creatures. Mr. Beebe and Mr. Tee-Van were photographing them, and as they were my especial pets, I was standing by to assure their good behavior. Pierie, the larger of the pair, obstinately refused to turn his head toward the camera, whereupon I, thoughtless from constant association, slapped him briskly. Thereupon my hand would have made a splendid object lesson for the S. P. C. A. with my fingers bristling with barbed quills, each one having struck deep enough, even in that light contact, to draw blood. Instead of administering sympathetic First Aid, the Director cried, "That's interesting. Don't take them out. I want a photograph." So for the next half hour I posed my hand at various angles before the cameras, smiling somewhat grimly at the enthusiasts who remarked from time to time, "Never mind, it's all for Science."

A pair of the long-tailed agoutis, called by the Indians "adouric", and which are extremely rare, are also a part of our small and select menagerie, which is further ornamented by the presence of a chachalaca and a marudi, two of the large jungle birds with which we are well



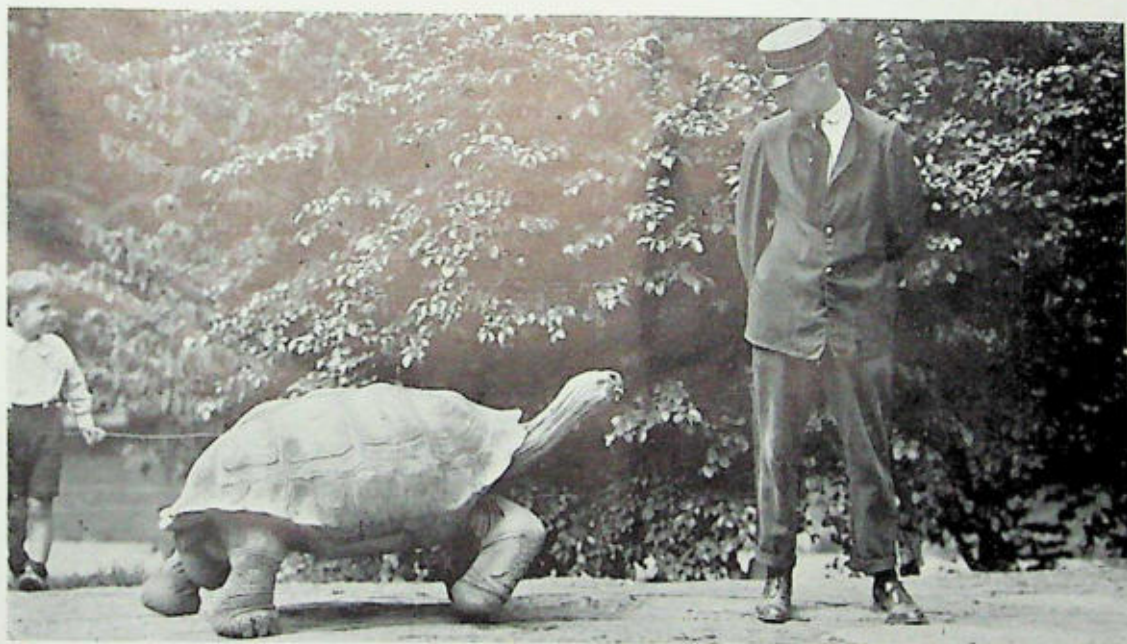
SHOOTING A LINE INTO A TREE

To ascend a tall jungle tree it was necessary for William Merriam to use a bow and arrow to cast the first line over a branch.

acquainted, gastronomically as well as zoologically. Several species of parrots, finches, and one yellow-headed vulture complete the list of birds, while the class Reptilia has but one representative, a rainbow boa, of iridescent beauty and respectable dimensions.

Perhaps the greatest triumph of this season's work is due to the efforts of Mr. William Merriam—the surmounting of one of the jungle trees. A tree on Cayuni Trail was chosen and after many tests with darts fired from revolvers and guns, Mr. Merriam decided that an Akawai Indian bow and arrow was the best means of assault on this tree. Lying on his

back he was able to draw back the stiff bow much farther than when used in the usual position, and with a light fish line attached to the arrow he shot it over one of the lofty branches. By this means a strong three-quarters inch rope and a pulley were drawn up, and when all had been made fast Mr. Beebe was pulled quickly to the top in a boatswain's chair, with no danger from stinging ants or wasps on the way. These tropical trees are so hard that climbing irons are wholly useless. The few observations which we were able to make in the short remaining time showed what a wonderful field of research this new zone of life will afford.



GIANT GALAPAGOS TORTOISE "BUSTER" IN THE ZOOLOGICAL PARK

Here is one specimen that is neither afflicted with "nerves" nor "temperament." He is not afraid, nor is he ill-natured. He will cheerfully follow his keeper and come when he is called. Possibly this latter impulse is obeyed with more alacrity when there is something good to eat.

ITEMS OF INTEREST

By RAYMOND L. DITMARS.

The Baby Giraffe.—Just at present the Park's "star" exhibit is the giraffe calf, born on July 17. An infant giraffe is a rare sight in captivity, and the animal's grotesque form and actions together with its large size for a newly born hoofed animal increase the general interest. The mother of this vigorous youngster was indefinitely loaned to the New York Zoological Society by the Ringling Bros. and Barnum and Bailey Circus. She is a Nubian giraffe nearly fourteen feet high and was born in January, 1910 at the Bridgeport winter quar-

ters of the circus. She arrived at the Park in April of 1920. Her weight at that time was thirteen hundred and thirty-five pounds, to which she has added possibly five hundred pounds since arrival. Her mate at the Park is of the same species, thirteen feet and ten inches in height.

Births.—We can record a number of interesting births the past spring and early summer. Among these are three yaks, four aoudad, three mouflon, five Himalayan tahr, two Barasingha deer, three American wapiti, three European red deer, five fallow deer, a mountain zebra and two swamp wallabies.



YOUNG LECHWE WATERBUCK IN THE ZOOLOGICAL PARK

The Society has just acquired two specimens, a male and female, of this very graceful and attractive species of African antelope. Both specimens are quartered at the Antelope House.



CAPE AARD VARK IN THE ZOOLOGICAL PARK

Three species of this curious African Edentate are known, the Cape Aard Vark, the Ethiopian Aard Vark and Eriksson's Aard Vark. The old common name of this equally odd mammal is derived from two Dutch words, "aarde" earth, "varken" pig; a name originated by the Dutch settlers for the southern species. As the Aard Vark can not be affiliated with any of the original Linnaean orders of mammals, it has been placed in an order by itself, called the *Oryzote-ro-pod' i-dae*. It is a strongly built animal, with strong legs, armed with powerful claws, distributed four on each front foot and five behind. Its food in its habitat is almost exclusively termites, and it is near their mounds that the Aard Vark usually makes his burrows. In the preparation of this shelter he is exceedingly brisk and thorough, and if pursued he can make a complete disappearance in a very limited time. It is stated that the flesh of the Aard Vark is very palatable, and that the skins can be converted into leather of some value.



AUSTRALIAN SWAN

Graceful birds assume awkward postures at times.

Ivan Dies.—One of the animal veterans of the Park's collections has passed on. This was Ivan, the huge Alaskan bear, which arrived at the Park in July of 1903. Ivan was then a rollicking cub, having been born the same year. He was captured near Port Moller Bay, Alaska, by Belmore H. Brown and John Hubley. Twenty-one years appears to be a fair age for a bear and Ivan led a happy, good-natured life, never making a hostile move towards any of the keepers who daily entered his great rocky enclosure during this long period of time. To one unacquainted with his ways, he presented a fearsome sight when rearing on his hind feet, for he towered nearly nine feet, and weighed, during his prime, approximately a full thousand pounds. Old age grew markedly apparent during the past two years. He passed away very peacefully in a nook where he had been sleeping for several nights.

New Comers.—Besides the interesting series of births this year, we can also record the purchase of a considerable series of rare and remarkable mammals and reptiles. Most noteworthy among these is the aard vark, and while the species is rated as being delicate in captivity we are not inclined to agree with this contention after three months' observation of our large and vigorous specimen, which is active, good natured and possesses a keen appetite for nourishing food. A pair of white-lipped peccaries recently arrived; an elusive species that always has been rare in captivity. These animals were shortly followed by a fine pair of young

Lechwe waterbuck. One of the recent prizes is a young specimen of Baird's tapir from Panama. Among the rodents are two species for the first time exhibited in the Park. One of these is the long-tailed acouchi; a rare member of the agouti group collected by Mr. Beebe near our tropical station at Kartabo. The other is the giant rat, a South African species, purchased from Ellis Joseph.

Wall Paintings.—The entire series of scenic backgrounds in the big cages of the Reptile House has been renewed after much study and experimentation. This formidable task, representing a surface of approximately three hundred feet in length by eight feet in height (including the partitions) was accomplished by Mr. Paul Herzel, whose noteworthy animal paintings, many inspired by studies of the Park animals, have produced much favorable criticism. In working along the series of cages, Mr. Herzel created varying scenes of cypress swamps, mountain ledges, deserts, tangles of Malayan jungle, and by a skillful blending of extremes on the broad partition-walls, avoided clashing of markedly different flora relating to the home areas of our reptilian exhibits.

New Squirrel Exhibit.—Through the interest and generosity of Dr. Lillian Delger Powers of Elmsford, N. Y. we have been able to construct two large arched outdoor cages, fifteen feet high, twelve feet wide and twenty feet deep, to form a special exhibit for the larger species of squirrels. They are provided with branching trees, long horizontal branches for



AUSTRALIAN SWAN

which in the bird's moments of relaxation are strongly emphasized.



MOUNTAIN ZEBRA AND COLT BORN IN THE ZOOLOGICAL PARK

A Mountain Zebra is a prize in any Zoological collection; a pair is something over which one might boast freely; but the birth of a colt is a matter that would create enthusiasm. This well set-up and handsome little animal was born at the Zebra House and it demonstrated its good qualities by leaping over the mother's back as she was lying on the floor, not more than 10 hours after birth.

runways and sleeping boxes at the rear. This installation, which is partially experimental, may be followed in the near future by the construction of a pretentious series of inside and out-door cages specifically designed for exhibition of the more showy species of squirrels of the world.

Kangaroos Thriving.—The steady breeding in our series of kangaroos has resulted in the accumulation of duplicates, which so overcrowded the easterly side of the long building featuring the exhibition of kangaroos and wild swine that we have found it necessary to sell the following specimens: five black-faced kangaroos, three Woodward kangaroos, one rufous-necked wallaby, four ring-tailed wallabies and one black swamp wallaby.

Gabong at Play.—As an illustration of the strength of a half grown orang-utan, it is interesting to mention an episode at the Primate House quite recently. Extending from the roof immediately outside and over the orang cage

is a heavy copper drain pipe. With the smaller oranges enjoying a noon-day siesta during a hot period and thus lacking a cagemate to engage in play, the larger orang looked around for something to do and after some simian deliberation, decided to remove the pipe. This was stoutly soldered to the roof connection, but the crash of falling metal warned the keepers that something was wrong and they discovered that Gabong not only had wrenched the pipe free from the soldered connection, but had broken the metal gutter as well. As they arrived at the scene of operations he was engaged in the heroic task of pulling the pipe into the cage between the bars. It was rescued too late to be of further service. That incidents of this kind among the animals often occur at inopportune times was emphatically illustrated by the prompt arrival of the heaviest thunder shower of the summer. There being no leader to carry off the rush of water from the north roof of the building the outside cages and keepers' passage were subjected to thorough flooding.



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HEAD OF THE GIANT FOREST HOG

A male shot near Poko, Wele District. The grotesque whitish eye warts and the characteristic erectness of the bristles of the coat are well seen.

Photograph by C. A. Reid.

ZOOLOGICAL SOCIETY BULLETIN

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NOVEMBER, 1924

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AFRICAN FORESTS, BUSH AND BUFFALOES

By CUTHBERT CHRISTY, M.B., C.M. (Edin.)
*Author of "Big Game and Pygmies."**

Illustrations from photographs by the Author, C. A. and A. E. H. Reid and Sig. Ribotti

BY far the greater portion of tropical Africa today is covered, not with forest, but with long grass and trees, which is the type of vegetation known in Africa as "bush." It is an intermediate stage in the process of gradual desiccation and change from true evergreen, moist, high Congo forest to grass, scrub, camelthorn and desert. Trees do not necessarily make a forest, and bush is not forest. Between the two there need be none of the confusion so frequently met with. In real tropical rain forest, there is no grass. The overhead leafy canopy is too complete to permit the penetration of abundant sunlight, without which, apparently, grasses cannot grow.

Once the old forest is destroyed, with its moisture-carrying humus, by fire or otherwise, it never recovers. A drier type of vegetation, known as secondary or mixed forest, takes its place, in which the species of trees, with a few exceptions, are distinct from those of the original forest. Following the destruction of the secondary forest comes the bush, the main feature of which is grass with scattered trees and bushes, of yet another type, which has developed hard wood, corky bark, brittle leaves, and other partially fire-resisting qualities.

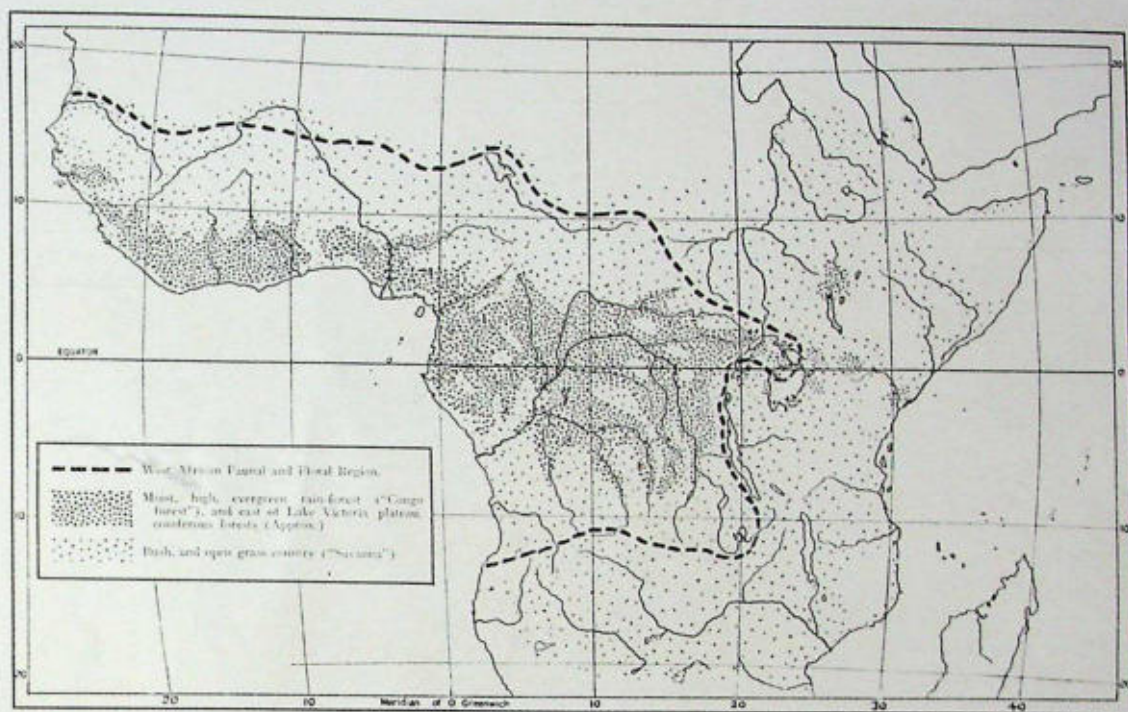
There is abundant evidence that the forests are fast diminishing in area, and from the presence in the Libyan desert and other places of forests of fossil tree-trunks, and for many other reasons, it seems certain that at one time practically the whole of tropical Africa was

covered with moist, high forest, which, as the Saharan region developed, was gradually reduced to a wide equatorial belt stretching from sea to sea. Today, that great belt is still further diminished, and now consists merely of a series of more or less disconnected blocks, extending from Uganda and the Albertine Lakes Rift westward to Sierra Leone. It has receded altogether from the east coast, leaving only isolated patches.

If the tropical region was at one time forest covered, its fauna was then a forest fauna. From certain indications, and the discovery of fossil remains, it is believed that the direction of migration of that fauna, with the exception possibly of the elephant and the rhinoceros, which seem to have existed on the continent from a very early period, was from the northeast, at a time when Arabia and Europe were, as the geologists tell us, more closely connected with Africa by land than they are now; at a time, moreover, when Africa was forest covered. After long ages of existence in dark forest surroundings, both the fauna and man, to judge by what is left of them today, diminished in size, presumably by a process of adaptation, known as the survival of the fittest, the smaller individuals being better adapted to pass with ease through the underwood and tangled vegetation.

From whence the present African fauna was introduced, and whether the animals originally were pygmy animals or became dwarfed by their long forest existence, matters little for the purpose of this article. The more important point is: If the primeval forests have so greatly diminished, leaving only an insignifi-

* "Experiences of a Naturalist in Central African Forests, in Quest of the Okapi." Macmillan & Co. New York. 1924.



PRESENT DISTRIBUTION OF HIGH RAIN-FOREST AND OF THE BUSH, AND GRASS REGIONS IN AFRICA.

cant equatorial belt, what has become, during the time the change has been taking place, of the many species and the vast number of animals which once made up the forest fauna?

If we read aright the lessons to be taught by a study of the okapi, or the forest elephant, or the little forest buffalo, we will, I maintain, realize that the greater number of individuals of these species or their descendants have gradually undergone very radical changes, becoming bush animals, just as the forests have changed into bush. Some may have died out, some to this day still exist only in the forest, some have long ago lost all their forest associations, while others are still undergoing the process of transformation.

A study also of the human inhabitants of what remains of the forest leads us in the same direction. The little Bambute Pygmy, made famous by H. M. Stanley, inhabiting the Ituri Forest, the smallest of all the known Pygmy races, averaging about four feet in height, has existed only by hunting, and has never left the forest. Whether he was always a Pygmy, or has acquired his diminutive stature by the process of adaptation referred to, as I have said, is a matter of doubt. It is a fact that his skin is very light in color, and upon it has developed a fine, downy, light-colored hair.

In many parts of tropical Africa, as in other parts of the world, are scattered Pygmy races, all of them, I believe, once forest people, but none so small as the Bambute. As the forests have disappeared, these Pygmy races have become marginal forest people or quite isolated, and to meet the changed conditions they have learnt to live by agriculture as well as by hunting, have learned to boil vegetable food, and build some sort of permanent habitations. As a result their stature has with the lapse of time slightly increased. This has been used by anthropologists as an argument to deny the Pygmy origin, they asserting that if the Pygmy can increase in stature under better life conditions he is merely the dwarf which Stanley originally called him. The skin of these Pygmy people also has become blacker; but this, so far as I have been able to judge, is certainly not the result of any interbreeding with their bigger brothers. They have been forced to adapt themselves to their altered conditions, and in the process have undergone, and are still undergoing, various radical changes.

In the Semliki Valley, on the outskirts of the forest home of the Pygmies and of the okapi, may be seen marginal forest tribes of sturdy, very virile, pygmy-like people, who live in the sunlight and grow garden produce, but other-



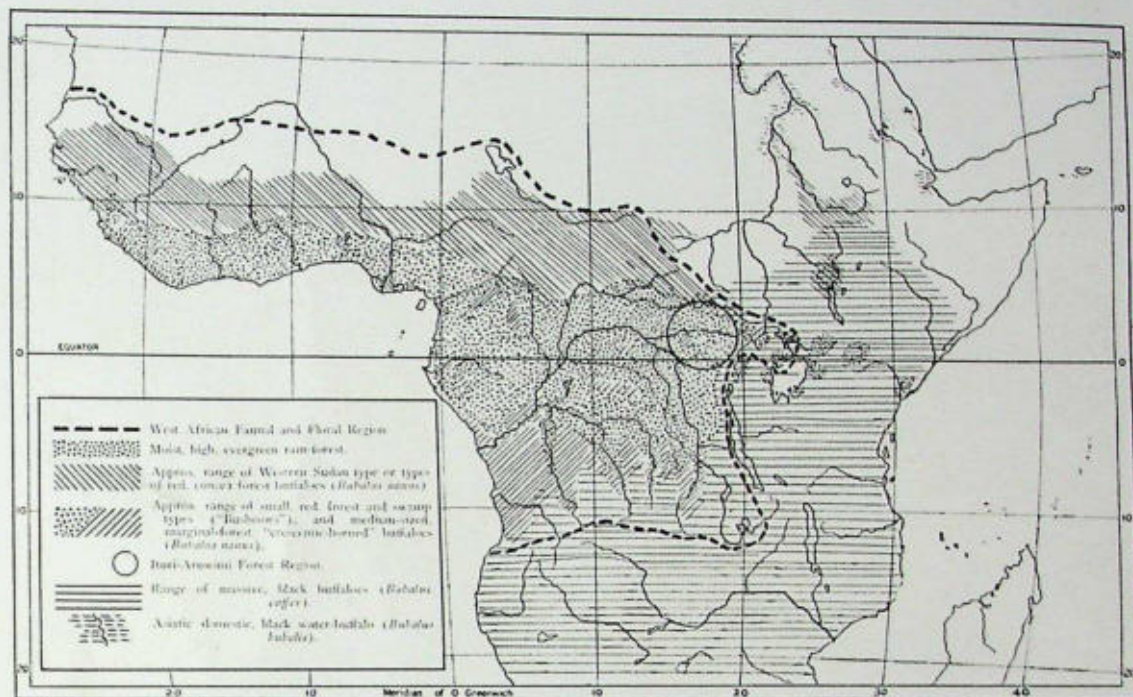
A YOUNG OKAPI ABOUT A MONTH OLD

This little animal survived for some weeks at Bambili on the Wele River in 1907.
Photograph by Signor Ribotti.

wise retain their Pygmy characteristics. They are slightly taller and darker in color than the Bambute, and obviously are gradually losing their forest associations without, however, merging with their big, black brothers, with whom, as far as I know, they have no family relations. Between even the most specialized of the pygmy

races and the full-sized natives is a very wide gap.

The okapi probably was a very common species on the forest covered continent of ages ago. It is now a rare animal found only in the Ituri-Aruwimi forests, the far recesses of which it never leaves. Today it is a mere remnant of



DISTRIBUTION OF THE AFRICAN BUFFALOES IN RELATION TO THE CENTRAL AFRICAN FOREST REGIONS

the past, like the forest which it inhabits. Though possibly reduced in size, it probably retains the main features and coloration of its original stock. Its close relative, the giraffe, now a bush animal, is never found in true forest, and it must have become detached at a very early stage in okapi history. At one time during the process of transition the giraffe was doubtless a marginal forest okapi, and the ancient rock-drawings of an okapi-like animal discovered in certain caves in Upper Egypt may represent some such phase of the species.

It is of interest to note here that the Ituri-Aruwimi forests, which alone contain the okapi and the smallest of the Pygmies, lying as they do in the very centre of Africa, near the northeast corner of the Congo drainage area and farthest from its outlet to the Atlantic, have by reason of their inaccessibility been some of the last to be explored of the great tropical forests for which the Congo is famous. They are, moreover, at a considerable altitude, in the region of 3,000 feet, on the "backbone of Africa," that great upland and mountainous watershed which stretches from Katanga and the South African plateau, through Darfur and the Tibesti highlands, to Morocco. They are consequently on the oldest portions of the continent,

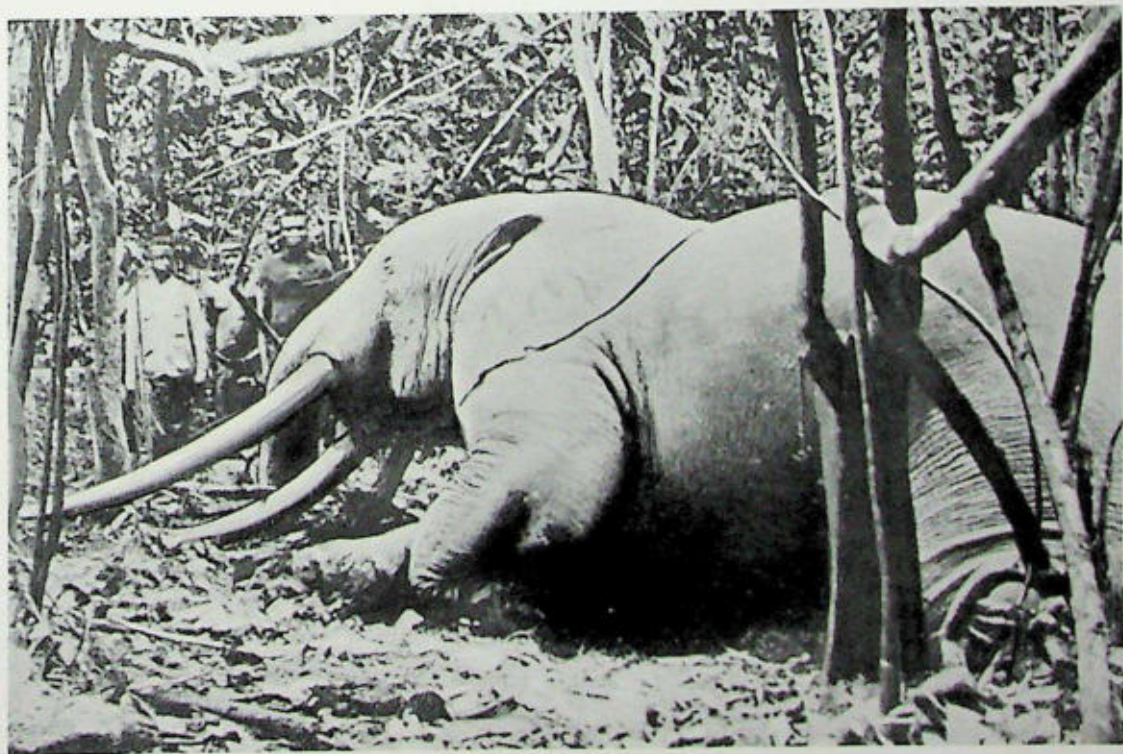
those which presumably were the first to be raised above the sea.

The Ituri Forest is remarkable also for being the habitat of the smallest and most primitive of the little red buffaloes, the giant scaly ant-eater (*Manis*), the giant aardvark (*Orycteropus*), the otter-like potamogale, and other comparatively little-known denizens reminiscent of a bygone forest age. In fact the Ituri seems to contain many of the last remaining representatives of Africa's one-time virgin forest inhabitants, both animal and man. Similarly, like rapidly drying puddles with their concentrated pond-life approaching destruction, lakes Tumba and Leopold II, lying surrounded by vast swamp areas at the bottom level of the Central Congo basin, once a great inland sea, may yet be found to contain new and interesting forms, not only of fish, but of water animals.

My Lord, the elephant, affords another instance of the anatomical and other changes which have occurred and are occurring during the process of his gradual transition from a forest to a bush habitat. As the forests receded and isolated blocks disappeared, the herds of elephants inhabiting them have been obliged to readjust their mode of life, and have eventually taken to a bush existence. In so doing the bush



A BIG ELEPHANT IN TYPICAL BUSH COUNTRY
Dr. Christy is seen writing up his journal.



A BIG FOREST ELEPHANT IN THE ITURI FOREST
The character of forest growth is well shown.



A

B

C



D



E

LITTLE RED FOREST AND MARGINAL FOREST BUFFALOES

A—Kisantu, Lower Congo; B—Congo da Lemba, Lower Congo; C—Makaia Ntete; D—Pilibili, Ituri Forest;
E—Mawambi, Ituri Forest. All male specimens of *Bos nanus*.

elephant has become a less hairy and much larger animal. He has developed long and large, soft ivory, tusks, which he carries as the mammoth did, straight out in front, in a way which quite unfits him for passage through the forest; whilst his smaller forest ancestor carries his smaller, straighter and shorter, hard ivory tusks vertically, near his knees, pushing his way through the forest underwood, with his trunk "nose," and using its tip to lift branches and creepers out of his way.

Amongst other differences, the ears of the bush elephant are quite distinct from those of the forest and Addo Bush animals; the latter no doubt being a remnant of the forest stock. They are more or less acutely triangular, with the lower lobe long and pointed, while the forest elephant's are comparatively large and rounded, the lower lobe being inconspicuous. The forest elephant, my experience has taught me, never goes far if at all beyond the margins of his forest, and the herds, I am practically sure, never mingle with those in the bush. Between the forest and the bush elephant there is an average difference in height of two feet. Though not hitherto recognized as such, the two types are almost if not quite as distinct as the white rhinoceros is from the black.

The most instructive instance, however, of this process of gradual transition of the forest animals to a bush existence as the forests gradually disappeared, is that of the little red Ituri Forest buffalo familiarly known as the "Congo buffalo." Their special interest lies partly in the fact that the transitional stages may be seen in progress, and the various intermediate types studied at the present day.

The subject of the African buffaloes, and the specific status of the various types and races, is of such importance that I may perhaps be excused for dealing with it here at some length, especially as my acquaintance with a number of the types extends over many years, and in widely separated parts of the continent.

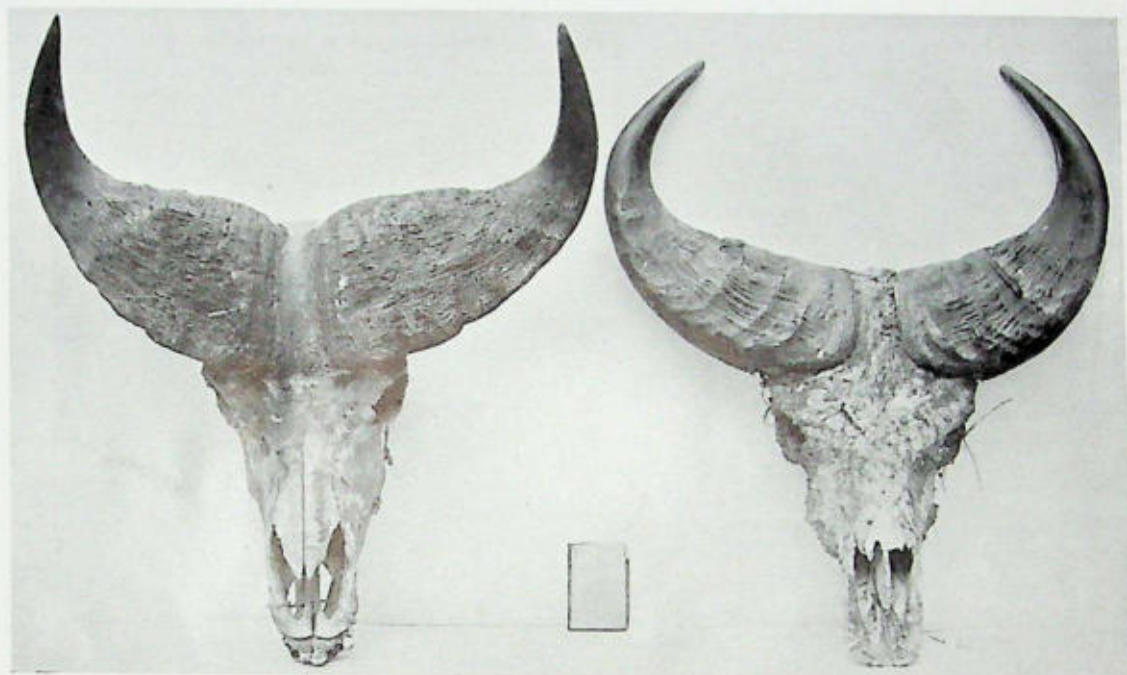
Long after the discovery of the massive, black Cape buffalo by the early Dutch settlers in South Africa, Du Chaillu, in 1861, obtained the first specimens of the little, red, equatorial forest buffalo from the Congo. These two extreme forms, the big black and the little red, are very unlike, and much uncertainty has existed as to whether they and other intermediate types to be found in tropical Africa are merely local races of a single variable species, or specialized representatives of two distinct species.

In 1875 Sir Victor Brooke, reviewing the subject of the African buffaloes, divided them into three species: (a) The Congo Buffalo (*Bubalus pumilus*), the small, hairy-eared buffaloes of equatorial, western and central Africa, height forty-two inches; (b) the Abyssinian Buffalo (*Bubalus equinoctialis*), general range North-east Africa, height fifty inches; (c) and the Cape Buffalo (*Bubalus caffer*), general range Africa south of the equator, height fifty-nine inches. Subsequently systematists were for long content to divide them into five geographical races: (1) Cape; (2) Abyssinian; (3) Senegambian; (4) Congo; and (5) Lake Chad.

In 1913, Mr. R. Lydekker of the British Museum grouped all the various types under two headings, according to whether the horns of the males had an initial downward sweep, and therefore did not lie in the same plane for any appreciable distance of their length; or whether they extended upwards and outwards from their bases without any downward sweep. All the various types included by him in the first group are massive, black, Eastern or South African bush animals, whereas all those in the second group are from regions within the West African faunal and forest area. Although he does not appear to have expressly referred to forest and bush, and indeed knew practically nothing of the habits and habitats of the beasts themselves, his classification into forest and bush animals is, I believe, the correct solution of the problem.

I am convinced that the only way of arriving at a satisfactory understanding of the origin and significance of the various types of these buffaloes is to make a study of their habits and habitats, in addition to their coloration and horn characters. (This applies equally to the elephant and to some other African animals). It will then be found how very different are the forest animals from the bush types. To attempt to map out the local geographical range areas of the local types of either the little red buffalo or of the elephant, would seem to be futile unless the limits of the true forest are at the same time equally carefully mapped. If the true forest is recognized, the result will show that the variations in zoological types are correlated with their environment—forest, marginal or transitional forest, and bush—each exercising definite modifying influences, irrespective of geographical position.

With the exception of the Blue Nile and Abyssinian type, which seems to have become completely stranded, all the red buffaloes (*Bu-*



A

B



C



D

LITTLE RED FOREST AND MARGINAL FOREST BUFFALOES

A—Kasinde, Lake Edward; B—Bakambuli near Lusambo, Sankuru; C—Mawambi, Ituri Forest; D—Fini River Swamps, Lake Leopold II. All male specimens of *Bos nanus*.

balus nanus) inhabit the West African faunal and forest region, which extends from about Benguela, in Portuguese Southwest Africa, to Senegambia, and inland to the western or Lakes Rift and the Chad-Niger Sudan. Except the western Sudan type, mentioned below, these buffaloes are comparatively small animals. They have little or none of the ferocious, heavy appearance of the massive, black, Eastern and South African species. The ears are fringed, and have a white or straw-colored lock on one, sometimes two, of the diagonal ridges of their anterior surfaces. All are red, tawny red or brown in color, except the aged bulls and some old females, which become quite black. The dark phase appears first as a mantle on the shoulders and back. All the calves and young of both sexes are red.

The horns are distinguished by their small size, short and flat form, and their upward, outward and backward direction, with no initial downward sweep. At their bases they are widely sundered, and have comparatively little inward curve. Their bases are but slightly enlarged, and have practically no bossing. Only in the largest and most specialized types are the horn bases as much as six or eight inches in width, flattened, ridged and rugged.

The smallest and apparently the most primitive of these red buffaloes is to be found in the Ituri-Aruwimi forests, where it is extremely common. It may possibly occur in the Cameroon forests also. Its average height at the shoulder is little more than forty inches. (I am unable to be more exact owing to the loss in the forest of my field-book, with its store of measurements and sketches). These animals never leave the dense forest, whereas the massive black species is not found in high forests. They browse as well as graze, their only grazing grounds being the little open spaces ("eddos"), and occasional grassy banks, along the forest streams and on the river islands. The small herds are self-contained, never mixing or mingling, I believe, with other herds. The type is often spoken of as the pygmy, forest buffalo.

On the margins of the forest, where it either merges gradually into bush or grass, or is broken up into isolated patches, and in the great swamps of the Congo basin, are to be found various types of buffaloes which are evidently modifications in size, coloration and horn characters of the diminutive forest animals. They retain the chief characteristics of the group, but have increased in size, due no doubt to better grazing conditions and sunlight. The horns

have become a few inches longer, in some cases angulated, in others somewhat more incurved, so as to appear almost crescent-shaped. The most conspicuous and most numerous of these marginal forest animals, and the most consistent in its modifications, is that which, in my recent volume "*Big Game and Pygmies*,"* I have called the crescentic-horned type. It is extremely common in South Congo, and large herds are to be seen in those regions where the advancing bush extends between the many rivers far into the forest belt, as in the Kasai, San-kuru and Lomami districts.

But the most notable of all the types in the red group of buffaloes, and about which perhaps least is known, is the Western Sudan. Its very extensive range area lies between the Saharan desert region and the northern margin of the equatorial forest belt, extending across the continent from Senegambia to Lake Chad, and probably through Darfur to the Blue Nile and southern Abyssinia. Included in this type or types are the largest and darkest-colored animals of the group. Otherwise they retain all the chief group characteristics. In color they are tawny red or brown, except the Sierra Leone and far western examples which are dark brown. Though large animals, carrying horns of considerable spread, they are quite unlike the massive black species of East and South Africa, both in build and horn characters. The horns are without the downward sweep and great inward curvature, and their length is mainly in their tips. In the oldest animals the palms, though wide, are flattened and rugged or ridged, instead of being heavily bossed. Judging from the very few specimens of this type existing in museums, and from the very few examples I have shot or seen, I believe that the largest animals with the biggest horns are to be found at the far western end of their extensive range area, 2,000 miles or more away from the Nile and the nearest massive black buffaloes.

Although there is a distinct intergrading of characters between the diminutive Ituri Forest animals and the large western Sudan type, which has almost lost its forest associations and become an open country animal, there is a wide gap between the latter and *Bubalus caffer*, the

* "*Big Game and Pygmies*." *Experiences of a Naturalist in Central African Forests in Quest of the Okapi*. By Cuthbert Christy, M.B., C.M. Macmillan and Co. London and New York. 1924. In this book chapters XV., XVI., XVII, deal with the question of the African buffaloes in much greater detail than in the above article.



AN OLD MALE BONGO SHOT ON THE ITIMBIRI RIVER, UPPER CONGO

This exceedingly striking animal with its bright chestnut-red coat, white chevron on the forehead, white crescent on the breast, and large white cheek spots, is striped transversely, as is the eland, across the back and sides with ten to thirteen distinct, narrow white stripes.

Photograph by C. A. Reid.



GIANT FOREST HOGS AND A LITTLE RED ITURI BUFFALO
 The specimens were shot near Avakubi, Ituri District, Upper Congo.
 Photograph by A. E. H. Reid.

Cape species. From any thousand mounted heads of African buffaloes there would be no difficulty in separating all those of the Cape species from those of the red group, mainly from their horn characters alone. If each head could be placed for examination at the same angle with relation to the basi-cranial axis the selection would be facilitated.

If then the red group, with its many varied types, is so widely different from the black group—in which the animals are all very similar, what, then, is the origin of the massive black species? It may be argued that if the giraffe is a descendant of the widely different okapi, the Cape buffalo, with its heavily bossed, wide spreading and incurved horns, with a downward sweep, may have descended at a very remote period from the original stock of the red forest species. It is possible however, that it has descended from an entirely different stock, which, if it migrated from the north-east, was probably introduced at a time when the forests, already curtailed, had receded from the east coast, thus leading the invasion southward. The gradual increase in size and horn dimensions that seems to have taken place as the animals spread to the far south was doubtless due to better grazing grounds and the effects of sunlight, until the maximum development was at-

tained on the grass plains of the Cape region of South Africa, where they roamed in enormous herds, until the man-with-a-gun at last interfered. South of the Zambese the great Cape buffalo is now almost unknown. This theory, however, does not explain its original derivation, whether from the European bison or from the black water-buffalo of India.

In the accompanying map illustrating the distribution of the two great groups or species of African buffaloes, and the chief local sub-groups of the forest red group, the range areas are of course very approximate. Little reliable information has as yet been published on the subject, and my own personal knowledge of some of the most important regions is nil, especially of those in the west. Descriptions of the various marginal forest types of little reds to be met with in south Congo are much wanted, as also of the types occurring along the northern margin of the equatorial forest belt. In this latter region probably occur crescent-horned and other types, as transitional forms intermediate between the little forest animals and the larger western Sudan type.

* * * *

Since writing the above I have read a very interesting paper on "Size-Variation in *Pyrenestes*, a Genus of Weaver-Finches," by Mr.

James P. Chapin, and published in the BULLETIN of the American Museum of Natural History, New York.* From it I learn that at least one group of birds in Africa exhibits forest, marginal forest and bush types, in which there is seen a progressive increase in size from those inhabiting the forest regions to the open country forms. In the latter the much greater size and strength of the bill is a marked feature.

Mr. Chapin remarks: "The huge-billed *Sanguineus* and *maximus* must certainly be regarded as the most specialized of the genus, offshoots perhaps of the forest-dwelling stock, profiting

* Vol. XLIX., Art. IV., pp. 415-441. Issued Sept. 3, 1924.

by some more favorable condition just beyond the edges of the great forests. . . . If their distribution represents the area originally occupied by the genus it must be that the more primitive survivors have been crowded into the forest region. . . . The changing outline of the equatorial forest belt in the past has doubtless exercised a marked influence, through a sort of isolation."

This clearly indicates that in the bird world, as the forests have gradually receded or disappeared, changes have come about apparently precisely similar to those which I have described as taking place in the case of the red forest buffaloes, and others of the African forest fauna.



DEPARTMENT OF
TROPICAL RESEARCH
OF THE
ZOOLOGICAL SOCIETY



THE DEEP SEA OCEANOGRAPHIC EXPEDITION OF THE
ZOOLOGICAL SOCIETY

PLANS for the Ninth Expedition of the Department of Tropical Research are in full swing. The *Arcturus* has been officially turned over to William Beebe, director of the forthcoming trip, and the plans for the building of the laboratory, extra staterooms, photographic room, etc., are complete.

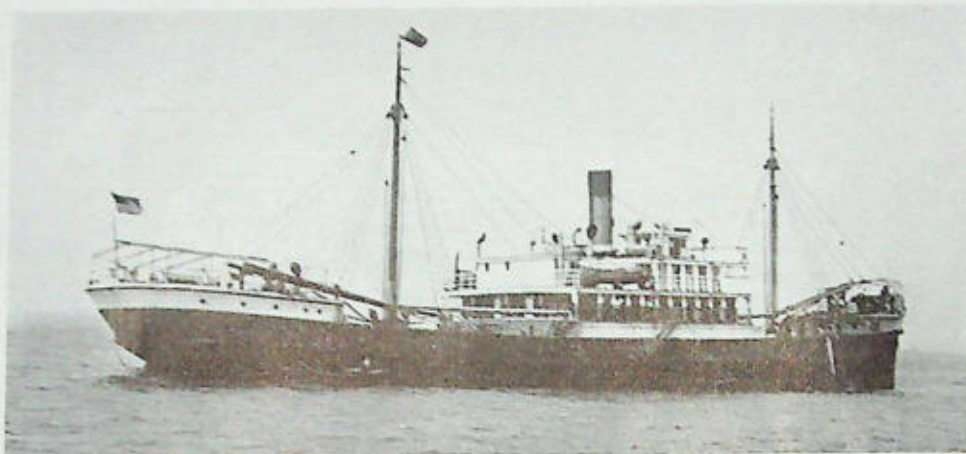
The expedition will start about January 1st, and the first stop will be in the Sargasso Sea. The eastern portion of this area will be explored and a month's stay made, at the point of greatest concentration of seaweed, by means of a large buoy anchored in about two miles of water.

The depths beneath this zone will be searched by all modern methods of dredge, trawl, nets, traps and hooks. In this way a more thorough knowledge will be gained of a single limited area in mid-ocean than has ever been achieved heretofore. The daily and weekly changes in temperature, salinity and density of the water, and in animal life will be studied and recorded. In effect the ship will function as an island, transitory and short-lived, but motionless.

From time immemorial the Sargasso Sea has been the source of myths and legends. On the ocean bottom far beneath, Atlantis is supposed to rest, submerged after terrible catastrophes. Believers in this lost continent consider the gods and goddesses of Grecian mythology to have been its kings and queens. Writers have peopled this great area of ocean's dead centre as covered with the wrecks of all ages, a huge forest of helpless vessels in the heart of which ancient Phoenician galleys may still float, amongst "slimy things which crawl with legs upon a slimy sea."

If the Zoological Society's Exposition succeeds in its intended activities it will discover creatures and unravel life-histories as wonderful and strange as any of these fantasies of man's imagination.

The *Arcturus*, when she sails, will be the strangest looking craft ever to leave New York harbor. She will have a movable bow-sprit or railed platform which can be lowered to within a few feet of the water, and from which any fish or other creatures floating in the path



THE ARCTURUS

From a photograph by William Beebe.

of the vessel can be harpooned or netted by a man on watch. She will have a runway with a hand-rail all the way around the outside of the hull, which will give access to any part of the length of the ship's side. Large search-lights, crow's nests near the very tips of the masts and the best of marine glasses will be in constant use to discover any interesting creatures within vision. There will be diving apparatus for work and study at shallow depths on submerged platforms in mid-ocean; numerous aquariums, tanks and wells for live fish and monsters of the deep will be employed; a dark room is to be built for the study of luminescence in deep-sea fishes, and all the equipment which science can devise will be brought into play to capture those weird forms of deep sea life of which comparatively little is known.

Most of the luminous fishes live at great depths, in a region of perpetual silence and total darkness, too profound to be affected by currents and where the unvarying temperature is only slightly above the freezing point. Some of these creatures, however, that do not inhabit the actual abysses, are known to rise nearer the surface at night, so nocturnal activities aboard the *Arcturus* will probably be almost equal to those of daylight hours. Dredging, trawling, and the use of baited traps after dark may be the means of securing hitherto unknown forms of life.

One of the objects of particular interest will be the attempt to secure specimens of the giant squid, those monsters of the deep which so far are only known through the remains found in the stomachs of great cetaceans. Authenticated measurements of tentacles of some of these

fragmentary giants prove that they must have a spread of eighty feet or more, and if the expedition is so fortunate as to encounter a living one, the excitement promises to be prodigious. The occasional visits of these unbelievable monsters to the surface have doubtless been the basis for those tales of sea-serpents which have enlivened marine literature of all ages. The appearance of thirty or forty feet of writhing tentacle, the rest of the animal being submerged, would surely be sufficiently startling and encouraging to the imagination.

A powerful wireless set will be installed on the ship and weekly reports, describing the adventures of the expedition, will be sent out. The most complete records will be kept by means of motion pictures, paintings and photographs, as well as by written descriptions and accounts. Casts and models of the most delicate and perishable animals will be made, and every effort is to be directed toward obtaining information as to the habits of various fishes,—a field of study which has been hardly touched as yet.

The extent of the Sargasso Sea varies in accordance with wind and current, so that some cruising about will be necessary in order to determine the most favorable spot for locating the floating island, but intensive work will be carried on all the time. Between the extremes of giant cetaceans and microscopic plankton, there will be enough material for study to occupy every moment of the six months which it is proposed to spend on this deep-sea expedition.

Full details of the preparations, together with the staff and schedule will be given in the next number of the Bulletin.

New York Zoological Society



OBJECTS OF THE SOCIETY

☞ A PUBLIC ZOOLOGICAL PARK. ☞ A PUBLIC AQUARIUM. ☞ THE PRESERVATION OF OUR NATIVE ANIMALS. ☞ THE PROMOTION OF ZOOLOGY.

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WILLIAM BAKER,

Director of Tropical Research and Honorary Curator, Birds

Each author is responsible for the scientific accuracy and the proof reading of his contribution.

VOL. XXVII NOVEMBER, 1924 No. 6

DR. CUTHBERT CHRISTY'S AFRICAN BOOK

Of the round dozen or so of good books on Africa and its animal life that have appeared during the past eighteen months, Dr. Christy's "Big Game and Pygmies" must at once be accorded a place in the front rank. After his seventeen years of work, exploration and study in the great rain forest and the surrounding bush country of equatorial Africa, Dr. Christy has given us an exposition of the wonderful wild life of that region that quickly challenges admiration. His studies of the whole group of small buffaloes, okapi, bongo, giant forest hog, bush elephants, forest elephants and other important but little known species, make his volume absolutely indispensable in every library or collection of books that even aspires to reveal the mammalian fauna of Africa.

In the fine article by Dr. Christy in this issue of the Bulletin, the reader will find a very illuminating exposition of the bush country and the forest, both of which are differentiated more sharply and clearly than we ever before have seen in a book. The illustrations are reproduc-

tions from plates that appear in the author's book, by permission of the publishers, Macmillan & Co., New York and London. *W.T.H.*

A FINE AFRICAN BOOK BY A GAME PROTECTOR*

So far as I can recall, Mr. A. Blayney Percival, late of the Kenya Colony Game Department, is the first real sure-enough, practical game warden to write a large book about his four-footed wards, their manners, and their troubles. His "Game Ranger's Note Book" is an undeniably fine and valuable contribution to the cause of game protection in Africa, and to the lore of African big game.

The author is a shrewd and careful observer, and a diligent recorder. If you doubt it, look for five minutes at his chapter entitled, "The Zebra: A Problem." Look, also, for the latest news about the giraffe situation, the status of the African elephants in Kenya Province, the buffalo, leopard, lion, and the big antelopes.

Mr. Percival and Captain Cauldwell were allies in the protection of Kenya big game, and both of them conspicuously made good. The volume is adequately illustrated, mapped and indexed.

THE ZOOLOGICAL PARK'S TWENTY-FIFTH ANNIVERSARY

On the night of November 8th, the officers and employees of the Zoological Park force assembled at the Boat House Restaurant, and at an excellent dinner furnished by the Zoological Society quietly celebrated the 25th anniversary of the birth of the Zoological Park, on November 8, 1899. It was strictly a family affair, of the 165 employees. The only guests present were Mr. Madison Grant, Chairman of the Executive Committee, to whom was presented a handsome loving cup, and Director William T. Hornaday, who received a gold watch.

The loyalty of the Force to the Zoological Park, and the deep interest of the Zoological Society in the welfare of the members of the Force, were strongly emphasized.

Frogs Delay Storks.—The storks of eastern Prussia have as yet given no indication of starting their regular southern migration, and the time of their customary departure is well past.

The abundance of frogs along the shores of the Baltic is given as the reason for the strange behavior of the birds.—*Herald-Tribune* (New York).

* *A Game Ranger's Note Book.* By A. Blayney Percival. Edited by E. D. Cuming. Svo, pp. 374. George H. Doran Co., New York. 86.

NEW BOOKS BY ZOOLOGISTS

Members of the Society will be interested in two books recently issued by Charles Scribner's Sons, written by men of this Society.

In their diverse fields, both writers have devoted prodigious labor and thought to the production of the works which from time to time have appeared under their names; a wholesome example to the generations coming along, and a standard of excellence to others in the same fields.

The titles of these new books are:

IMPRESSIONS OF GREAT NATURALISTS

By Henry Fairfield Osborn

TALES FROM NATURE'S WONDERLANDS

By William T. Hornaday

Maternal Instinct:—There was a time when Gabong, our female orang-utan was so docile that she could be taken from her cage and turned loose to romp with children—without a worry on our part. All this has changed. While Gabong is now approaching the dignity of close to a hundred pounds in weight, it is not her size that has terminated her romps outside the cage. We have had considerably larger oranges than this, which were uniformly docile. Nor is Gabong's temper undergoing a change. The trouble was produced by the introduction of two young oranges to share her cage. She immediately adopted these babies and developed such intense solicitude for their welfare that she refused to leave the cage without them. At any sudden noise in the building Gabong grabs one or both of the youngsters and hugs them to her. If the keeper makes any attempt to fondle one of the baby oranges it is snatched away by Gabong. To attempt to remove them from the cage produces a furore and as Gabong outwits all attempts to entice her from the cage, we have no "tame" orang-utan to romp with the kiddies, as in former years.

A RARE SPECIMEN

From "*The Value Mark*," New York City, October, 1924

"A number of college students, guided by a professor of ornithology, were wandering through the Bronx Zoo.

"The professor, drawing upon his fund of knowledge, explained the dominating characteristics of the various birds they passed. The students made notes. Finally the professor called attention to some native birds in the nearby shrubbery and commented upon their

habits. A park attendant joined the company and after listening for awhile, pleasantly interrupted the professor and said: 'I think you're wrong about that, Professor. I've been watching those birds for a month.' Then he explained why he thought the professor was wrong.

"The professor thanked him and then turning to the students said: 'I believe our friend here is right and I am wrong. What I told you was the best information I had been able to acquire from intensive reading, but even the best we get is never 100% authentic. No one knows all there is to know about any subject and the only way we can ever get at the real facts, if we can at all, is by reading, careful observation and straight thinking.'

"Then he shook hands with the attendant and thanked him for adding to his sum of knowledge.

"This college professor was a big man, bigger even than the letters after his name indicated."

PORCUPINES ANNOY RAILROAD

SEWARD, Alaska, Oct. 5 (By The Associated Press) (By Mail).—The government's Alaska Railroad has to fight porcupines. Rubber in any form is to the porcupine what waste paper and rubbish are to the American goat, popular for lunching purposes, and the railroad officials have ordered rubber hose in pumping stations and all rubber fixtures to be hung on high poles.—*The Tribune*, N. Y.

Something About Bees:—That bees are color blind and that they learn their way about by experience rather than by instinct is the conclusion reached by Profs. S. F. Frisch and Lothar Tiralá, German biologists. These investigators have shown that to the bee red and black look alike, orange and yellow look the same as green, and that there is no difference in the appearance of blue, violet and purple, says the *Detroit News*.

It was also discovered that the mysterious guiding influence by which the bee is brought back to its hive is nothing more than experience. It has long been known that bees find their way home sooner the longer they have lived in their hive. To test this common-sense view, bees were put to sleep by ether, taken to a new hive and moved some twelve yards away. None of them could find their way back to the hive until the third day afterward, when 30 per cent. got home. By the eighth day, however, 90 per cent. of them had learned to find their way back to the hive.—*The Sun*, New York.



THE WHITE
RHINOCEROS

Rhinoceros simus
(Zululand)

These huge animals have become so scarce that they are now confined to only two or three very limited areas in Africa, and it is incumbent on the various Governments to prevent the extinction of this remarkable species.

MOUNTED GROUPS IN THE NATAL MUSEUM,
PIETERMARITZBERG, S. AFRICA

DR. ERNEST WARREN, *Director*; F. TESCHNER, *Taxidermist*.

Text and illustrations from an official publication issued by the Museum.

THE pictorial cards accompanying this leaflet are reproductions of photographs of natural groups of mammals set up in the Natal Museum. The specimens are mounted in characteristic attitudes and are arranged amidst surroundings which represent as closely as possible

the special habitat of the species. Actual rocks and soil were used for the groundwork in all the groups; and for the vegetation, indigenous grasses, dried shrubs and small trees were employed, with the natural green color of the foliage restored by color-spray.

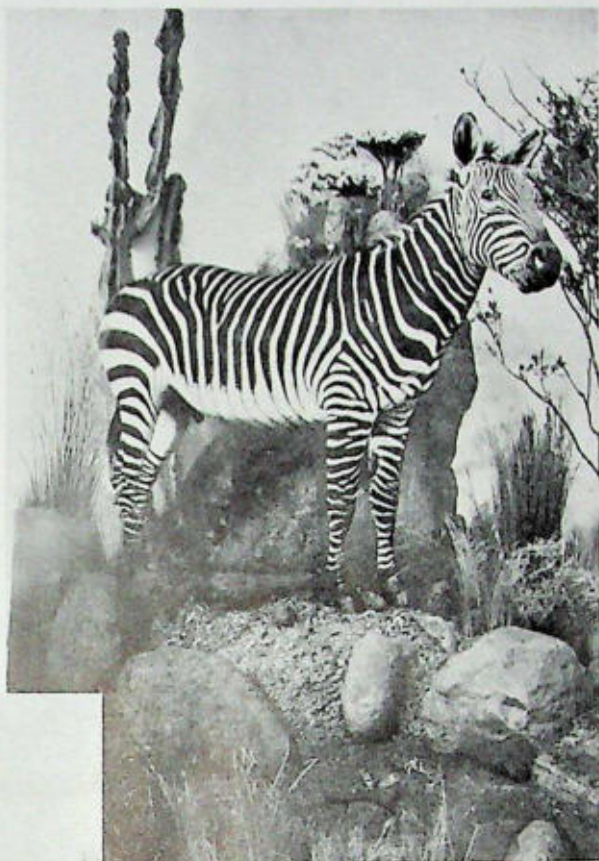
THE SABLE
ANTELOPE

Hippotragus niger
(Rhodesia)

These noble and wonderfully graceful Antelopes must be more adequately protected, or they will shortly be exterminated by the insatiable blood-thirst of hunters, settlers and natives.



The African fauna is in imminent danger of extinction over various extensive regions, owing to the increase in the occupation of the land, the arming of the native populations, excessive commercial exploitation in ivory and hides, and lastly, the insatiable lust for killing by settlers and others, assisted by modern deadly weapons and rapid motor transport. In any sport which professes to rise above the level of mere butchery the hunted must have a reasonable chance of escape, and what chance, it may be asked, have these charming and defenceless creatures against the modern rifle, the motor car and possibly the aeroplane, combined maybe with crowds of shouting native-beaters driving them in a terrified condition from every foot of cover. It is even the same with the larger mammals, such as the elephant, they have no chance against modern equipment. The valiant men who perform these deeds sometimes go so far as to photograph mortally wounded elephants and other mammals while endeavoring to



THE MOUNTAIN ZEBRA
Equus zebra (Cape Province)

This fine species of Zebra is now restricted to one or two small herds in the Cape Province, and stringent protection will be necessary to avert extinction.



AFRICAN LION AND LIONESS
Felis leo
From North Rhodesia.

rise or escape, and these sickening pictures are published in illustrated journals, or filmed for the edification of old and young. Why do editors thus sully their pages, or cinema proprietors disfigure their screens, without a word of dissent?

It may be confidently asserted that in very many extensive regions the wonderful African fauna, which is the richest in the world, cannot possibly survive another 20 years unless international legislation for its protection is instituted. It is essential that new regulations should be formulated which will act more efficiently and more generally than any existing game-laws.

The wanton and unnecessary destruction of Nature by modern civilization is an increasing evil, but it is good to note that such deeds as the slaughter of the Elk by the aid of aeroplane, and the wholesale butchery of the fascinating Emperor Penguin for the



A RIVAL OF "JUMBO"

The time is not far off when the height of the great "Jumbo," probably in his time the biggest elephant in captivity, will be equalled by our African elephant "Kartoum." At the rate of his present development, he bids fair to approach Jumbo's height, and if he behaves himself he may exceed it. This restless pachyderm meditates during his daylight hours on what he can do next to pass away the time. The skill of Mr. Merkel and his force have curbed this refractory animal's ambitious attempts to raze the fences of his corral, so that like Alexander he has become sad for the lack of fresh worlds to conquer. The Macedonian displayed astonishing ability in his short career, but as a master of craft and ingenuity in execution, this monster from the African forests is in a class of his own.

Photograph by Elwin R. Sanborn.

sake of a little oil, have not been accepted as legitimate actions by the Governments concerned. Also, it is being realized more generally that the wearing of wild-bird plumes is either a mark of ignorance, or a brand of crude indifference to the sufferings of the brightest feathered gems of the world. Surely all women must admit that for the sake of a temporary adornment it is not worth while that the most beautiful birds of the earth, which in many ways are the most perfectly organized of all living beings, should be blotted out of existence by the rapacious plume-hunter and the wild-bird feather trade. Behind every egret and other wild-bird plume in a shop window, picture a bird's nest filled with helpless, starving nestlings, and too often the mental picture would accurately represent the naked truth.

Without a changed attitude in the treatment of wild-life the African fauna is doomed in the near future, and the same may be said about the fauna of most countries. For example, the intensely interesting indigenous fauna of Australia is dwindling at an alarming rate, also, the destruction of whales, seals and other marine mammals is proceeding in such a ruthless and wholesale manner that it is certain that many valuable species will be shortly exterminated, unless some stringent international regulations are brought into force with the least possible delay.

For any reform to be really effective it is essential that in the education of the rising generation a greater appreciation for living things should be instilled. It is melancholy that so many parents consider a shot-gun as the most suitable present for a small boy, and if he can encompass the death of a little bird or timid buck the deed is proclaimed. This change in the education of the young is a fundamental necessity, if the world is to be saved from becoming a uniform and weary repetition of mechanical appliances and agricultural crops.

Under present conditions species are rapidly dying out; the Quagga and Blaubbok formerly abundant are now extinct, while the Bontebok, Mountain Zebra, Giraffe, White Rhinoceros and the southern form of the African Elephant are quickly approaching the same condition.

With the increased cultivation of the land it has become imperative, if the fauna is to be saved, that the various Government Administrations in Africa should set aside suitable tracts of country of adequate extent as inviolable sanctuaries for the indigenous fauna.

It is incongruous in the extreme that beautiful creatures like the Sable Antelope, the Lesser

Kudu, the Inyala, and the Gemsbuck, and the extraordinary animals such as the Giraffe, African Elephant and Whales, the result of aeons of evolutionary changes, should be blotted out of existence to satisfy a crude craving for slaughter or for some fancied temporary advantage or passing pecuniary gain.

The extinction by man of almost any natural species must be regarded as an aesthetic crime, while scientifically it is to be deplored as a most serious blunder, since the possible future uses to mankind of a natural species cannot be foreseen. It must be stated with emphasis that generally speaking the extinction of any natural species of animal or plant is a blank loss to the world which can never be rectified.

REPTILE PETS

By RAYMOND L. DITMARS.

IN an extensive collection like that of the Zoological Park there is a considerable number of very tame animals. Some of these display enough individuality to make them quite prominent among specimens of the same species they represent and in some instances render them general favorites among a whole series of specimens. Every building in the Park has its "star" animals from the keeper's point of view. These are not always the rarer types, but animals that are particularly friendly, intelligent, droll in actions or veterans in captivity. As an instance we would mention the Small Mammal House, a building containing an elaborate series of varied forms, many of great rarity. In the opinion of the keepers the most interesting animal in that building is a common woodchuck, which is so tame that it is at perfect liberty a great part of the time and even wanders out over the lawns in search of papers to line its nest.

As a rule we have requested the keepers not to select pets among the larger animals. This is from no fear that favorites will receive special care while others will be indifferently provided. We have never noted this inclination among our men. We are prompted to discourage the selection of pets from fear of treachery on the animals' part. This has been illustrated in several instances. The greater number of injuries among our keepers have resulted from undue confidence with "pet" animals of short and uncertain temper. But these conditions have by no means eliminated the selection of general favorites among the larger carnivores and the hoofed animals, although it is among our smaller specimens that actual pets may be



A YOUTHFUL STUDENT WHO IS NOT AFRAID OF SNAKES

A very docile boa is giving a practical demonstration that it rather likes its enviable position and does not object to petting. As a rule the boas become tractable and rarely are dangerous. It is this type of snake that is most sought by "snake charmers" of the circus. The pythons usually are quite the reverse in temper and often yield to the inclination to constrict, in which cases the handler comes off second best if the snake is large and help is tardy. The constricting power of a python or boa is almost beyond belief.

Photograph by Elwin R. Sanborn.

observed. It is the purpose of this article to illustrate the possibilities of taming the more eccentric kinds—the reptiles.

It is possible that our average visitor would consider the Reptile House the very last place in which to observe tame specimens, but those who have sympathetically noted this collection have often remarked about the varied series of our reptilian pets. One, of course, is of world-wide fame. This is Buster, the three-hundred pound tortoise from the Galápagos Islands, on exhibition in the Park over twenty years and figured in illustrated magazine and newspaper articles of North and South America, England, continental Europe, Asia, South Africa and Australia. Buster is a favorite of the children and may be driven around the Park paths by the simple method of sitting on his broad back and with an apple on the end of a long stick, pointing this to the right or left, or straight ahead—or wherever the driver wishes to go. The great tortoise will slowly follow the guiding apple held a foot or so in front of his nose, and being of leisurely gait and disposition is quite content to stalk the dainty with full assurance he will ultimately get it.

Alligators are not usually credited with anything but an extremely dull mentality, yet our family of big saurians immediately respond to the keeper's call, swim over to his side of the rail and, in a row, with widely opened mouths await dinner. Two of these creatures in particular can always be relied upon to immediately answer the call. One was hatched from an egg in the Reptile House twenty-four years ago. He weighed less than two ounces at the time of breaking through the shell—October 20, 1900—and his present weight is close to two hundred pounds. The other was in the writer's possession seven years before the opening of the Park, nearly twenty-five years ago, which places this veteran's life in captivity at approximately thirty-two years.

Our oldest alligator, however, does not hold our best record for long life in captivity. This goes to a specimen of the common spotted turtle, which has been a captive over forty-one years and is still thriving. It was found on a farm near White Plains in March, 1883, by the owner, Mr. Henry Welch. It was kept as a pet by Mrs. Welch until her death in 1922. This little turtle had free run of the house, but towards evening always returned to a certain corner where it retired under a cloth to sleep. It was presented to the Society in 1923 by Mr. H. B. Welch of 123 Waverly Place, New York

City. It is active and feeds with lively appetite, but the bold yellow bars on the head and round spots on the shell, usually vivid with the species, are pale—almost white—a condition produced either by captivity or age, but probably the latter. This interesting specimen is absolutely confiding, exhibiting no indication of fear or restraint when handled.

We consider the tortoises and turtles as markedly higher, mentally, than any of the other reptilian groups. A number of the tortoises trudge after the keepers as they rake the yards and while we realize that these actions are largely prompted by appetite, their alert demeanor and the interest displayed produces responsive feeling on the part of the observer.

We have had several interesting pets among the larger lizards. It is among these creatures, however, that the mental response of individuals of the same species is at great variance. Some are excessively timid, do not feed well and are delicate as captives, others are bold and savage, while a few take kindly to captivity at once, are fearless, although gentle and become remarkably tame. We remember one pet lizard that was particularly noteworthy. It was with us about twelve years, which is probably close to the natural life span of one of its kind. This was a South American tegu, representing a large, powerful and savage species, in fact attaining a length of about 3 feet. The tegus are carnivorous lizards, which attack small mammals and quickly tear them to pieces, either by violently shaking them or holding them with their feet and employing their keen teeth. We exhibit these lizards in big sandy yards and as a rule must use some care in going among them, as some of them will rush at the keepers and snap at their feet. They can inflict a severe bite.

In a batch of tegus fresh from South America was a particularly handsome specimen which failed to rush across the yard when liberated. We thought for a moment that it was injured, but it finally walked off in leisurely fashion. The keepers were soon particularly interested in this fearless specimen, which demonstrated no thrash of tail or threat with gaping jaws so frequent among its cagemates, and in a short time found that it would come to the feeding pan (filled with scraps of beef) and take meat offered to it from the end of a stick. The savage cagemates would rush to the pan, seize a mouthful of meat and dash behind the keeper, swallowing the meat on the run and darting in from another direction. This specimen was soon taking bits of meat from the men's fingers.

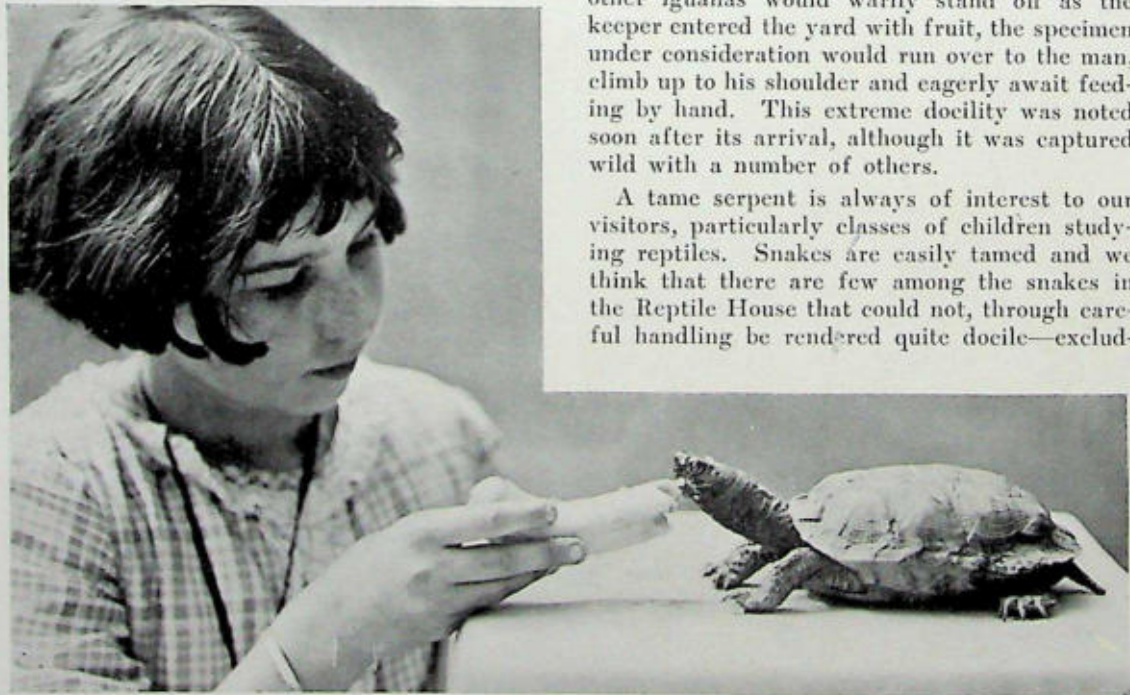


After a few months it was so tame that it could be picked up and carried about on one's forearm. It was nervous when restrained, but never attempted to bite. As an illustration of individual variation this lizard was of great interest. It was handled by hundreds of high school students, and owing to the marked contrast between its gentle habits and the savage nature of the other tegus, was regarded as the

star pet of the reptile collection for several years.

Another illustration of individuality related to a large iguana, quartered in a yard with about a dozen others. The iguana is another big South American lizard, attaining a length of four to six feet. They are timid as a rule, permitting little familiarity even after years in captivity. When restrained they fiercely bite and scratch with long, sharp claws. While the other iguanas would warily stand off as the keeper entered the yard with fruit, the specimen under consideration would run over to the man, climb up to his shoulder and eagerly await feeding by hand. This extreme docility was noted soon after its arrival, although it was captured wild with a number of others.

A tame serpent is always of interest to our visitors, particularly classes of children studying reptiles. Snakes are easily tamed and we think that there are few among the snakes in the Reptile House that could not, through careful handling be rendered quite docile—exclud-



A SPOTTED TURTLE FORTY-ONE YEARS OLD

The exceeding friendliness of this strange pet is quite apparent. It awkwardly walked along trying to reach the morsel of fruit extended toward it and when placed on the table, without showing the slightest timidity, ate freely of the banana, devouring the entire piece.

Photograph by Elwin R. Sanborn.

ing of course the savage cobras and most of the vipers. There are, however, certain snakes, owing to attractive form, brilliant coloration and moderate size that have been generally selected as pets, and the favorites from a considerable batch of their kind are those of the brightest colors.

In a series of a dozen king snakes arriving from the South, will be one or two of especially striking markings. It was one like this, blue-black, with broad gold rings, like bracelets, that was selected by Head-keeper Toomey as a pet. It would be difficult to estimate how many people have handled this snake, which will good-naturedly submit to the varied maulings which result from being passed from one to another in a crowd not versed in reptile handling. He has gone the rounds among delegates of conventions, has been handled by royalty, famous statesmen, visiting Indians, and been passed back and forth among classes of school children.



We have received numbers of letters offering to buy this specimen as a pet, and have kept a man in Florida busy supplying specimens as near like it as possible—for most king snakes become quite as gentle as this one.

Another interesting serpent pet that has received nearly as much attention is a five-foot, lustrous, pitch-black gopher snake, which hatched from an egg in the writer's photographic laboratory at Scarsdale, nine years ago. The writer was filming the hatching of a litter of serpents at the time and this little fellow crawled out at 2 A. M. The other members of the litter were presented to friends and this one turned over to Mr. Toomey. At the time of hatching, the little gopher snake was seven inches long. The head-keeper's success is well illustrated by the present specimen and we are

KEEPER TOOMEY HANDLES HIS CHARGES WITH TEMERITY

In the lower picture are three large boa constrictors and a rainbow boa. The upper is a collection of pine and chicken snakes. Occasionally, the latter species are a trifle peevish and bite recklessly. Affection among snakes is an unknown quantity. Skill in handling and deliberateness of movement soothe the reptiles to a state of passivity.

Photograph by Elwin R. Sanborn.

noting with interest the longevity of this gopher snake in captivity.

At the present time the largest tame serpent on exhibition is an Indian Rock Python, about twelve feet long. This attractively marked creature has been a pet in the true sense of the word. It was originally purchased by a dancer about ten years ago, and was then approximately four feet long. It toured the theatrical circuits of the United States and stopped between times at numerous boarding houses, nestling among blankets in a flat trunk. It slowly grew and to such proportions that the owner's dances were changed to conform to the snake's size, and finally the dancer—of rather slight physique—found it a staggering job to perform with the husky python in any form of manoeu-

ver. The snake was regarded with great affection, had outgrown several trunks and was finally retired to a theatrical hotel, where it flourished under the care of friends while the owner was traveling and demonstrating a new form of dance without serpentine assistance. The big python lived in the hotel for more than a year to the blissful ignorance of all guests but those engaged in the friendly conspiracy of giving it proper attention. Under these conditions we purchased it and when our keepers called for the specimen they found it basking on the carpeted floor of a large room, at perfect liberty. This snake appears to enjoy and in a mild way to demand attention. It will crawl out of the cage and over the shoulders of the keepers and is so gentle that a child could guide it.



BARN OWLS WITH THEIR WHOLE FUTURE BEFORE THEM

Because that is where most of them build their nests, this species is obliged to face the world with so commonplace a prefix as "barn." In this instance, these strange looking waifs first saw the light of day through the top of a big brick chimney. They were rescued by a friendly contractor who was about to raze the structure to which their strange birthplace was attached.

Photograph by Elwin R. Sanborn.

KILLING PREDATORY ANIMALS

U. S. Department of Agriculture

"The estimate that the average annual damage to livestock and game amounts to \$50 for each covote and bobcat and \$1,000 for each wolf and mountain lion, has received very gen-

eral acceptance," said Dr. W. B. Bell, Assistant Biologist of the United States Department of Agriculture, before the recent meeting of the American Society of Mammalogists, at Boston, Mass. In spite of the overwhelming evidence of damage done to the farmer and stockman and to the public in general through such depreda-

tions there are still some who contend that the fight to control these predatory animals by trap, gun, and poison should be discontinued or at least abated.

That many of these destructive predatory animals are partly beneficial is not denied by the Department of Agriculture. The records maintained by the Biological Survey show that bobcats, lynxes, and coyotes destroy many undesirable rodents, but in settled countries these predatory animals, with wolves and mountain lions, have learned to take domestic stock to such an extent that the losses are not to be tolerated.

Government hunters and scientists have made investigations of the food habits of these principal predatory animals by examination of the content of their stomachs, and the results show a decided taste on their part for domestic stock and for valuable game and birds. "In the case of the bobcat," says Dr. Bell, "it may be noted that of 3,990 items listed in a table showing a summary of the results of stomach examinations, 677 were meat of domesticated animals; 687 were of game animals, game birds, or other birds; 2,049 were of rodents; and 577 of various miscellaneous and relatively unessential materials, the largest number being bait employed in taking the animals. Sheep and goats were the favorites among the domestic animals on the menu of the bobcat, and poultry seemed to be second preference. Not a great deal of information was obtained on the Canada lynx, as only 80 examinations were made. In these cases evidence was found that 10 animals had been feeding on meat of domestic animals, mostly sheep, goats, and poultry. A number had eaten game animals and birds, and several had killed rabbits.

"More evidence has been obtained on the coyote than on any of the others. Of 36,989 items found in stomachs, 12,478 were parts of domestic animals, with sheep and goats strongly in the lead, beef second, and horses third, followed by poultry and pork. The coyote also destroys large numbers of grouse, as indicated by 1,268 items in the list. Evidence also was found that they have destroyed numbers of miscellaneous birds, deer, elk, and antelope. It must be said, however, that the coyote does destroy numbers of rodents, particularly rabbits, though the number of rodents found in the examinations was less than that of domesticated animals and poultry.

"The timber wolf depends almost entirely for his diet, according to the investigations, upon

meat grown by the farmer and ranchman. Out of 549 instances cited, 457 showed that domestic animals, chiefly cattle, had been fed upon. In addition, it was found that the wolves destroyed deer, antelope, and elk. Very few rabbits or other rodents were found in their stomachs.

"A table compiled on the food preferences of the mountain lion shows that it has a good appetite for beef and venison, the numbers running cattle first, deer second, and horses third, although these animals have long been thought to care more for horse meat than any other. It seems that they kill some pigs and wild game but seldom pay attention to rodents.

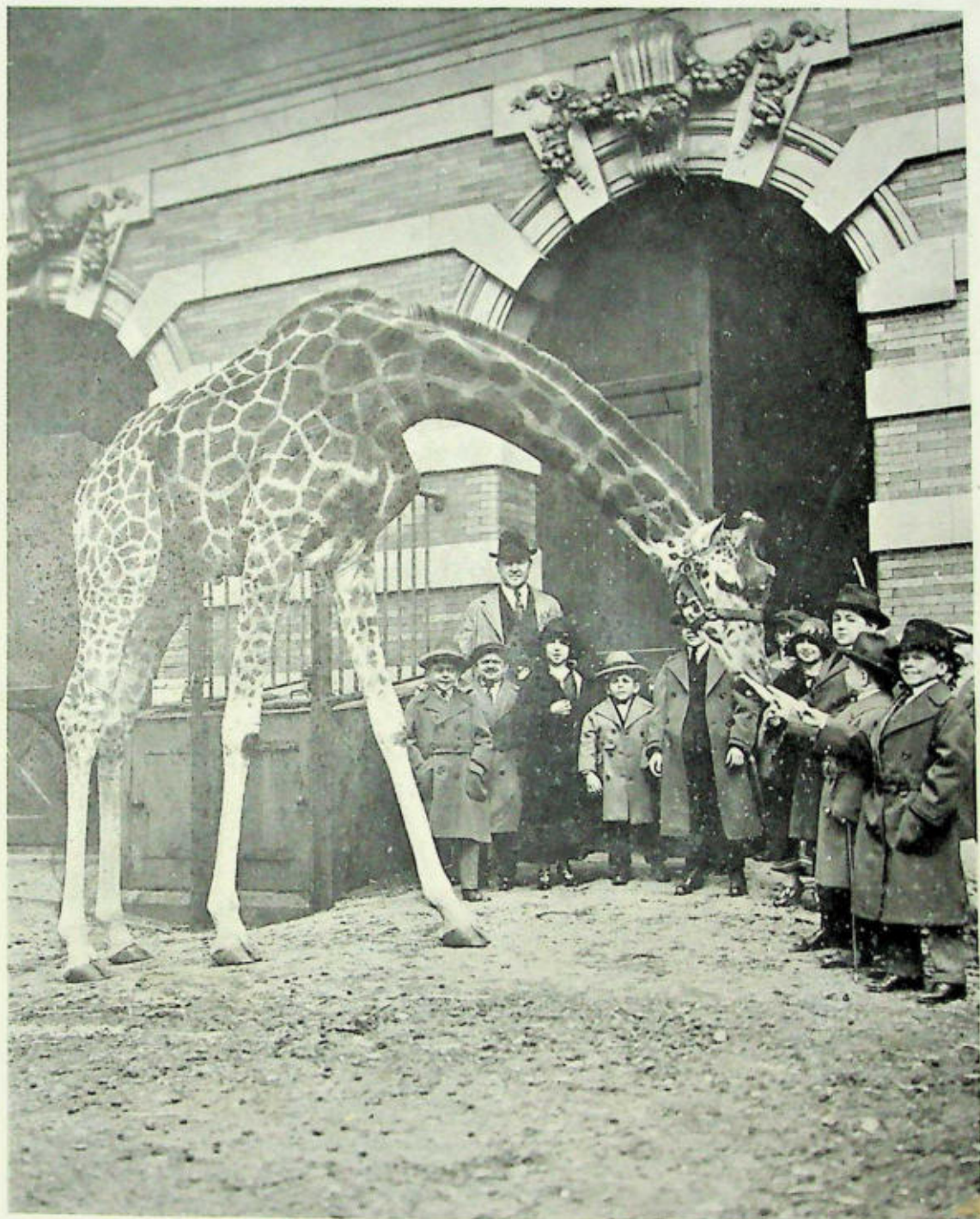
"In carrying on its campaigns with various States for the control or eradication of predatory animals in livestock producing regions, the Department of Agriculture has recognized that modern economic conditions make it necessary that livestock be produced at the minimum cost and, therefore, that all losses be cut down as far as possible.

"Game birds and animals are now recognized as a real financial and food asset of the country, as well as having other values. It is known that one of the greatest checks upon the development of this wild life is the predatory animal. In many regions where campaigns have been conducted against bobcats, coyotes, wolves, and mountain lions, game has increased noticeably.

"Because of the modern methods used in controlling destructive rodents, it is no longer necessary to preserve the predatory animals in order to keep down these other pests. Predatory animals do not prevent the occurrence of rodents in seriously destructive numbers, and the cost of poisoning and trapping these small animals is much less than the loss occasioned by the predatory animals. As a result of these campaigns against rodents and predatory animals enormous areas of land are today being more profitably utilized in the production of crops and livestock."

SWARM OF BEES AT SEA

WASHINGTON, Nov. 3.—The American steamship *West Nomentum*, which sends weather observations to the United States Weather Bureau at regular intervals, has reported a swarm of bees settled on one of its booms in front of the bridge on a recent trip from Yokohama to Portland, Ore. Captain L. Oetting said the bees remained for several hours. He has no idea where they came from or where they went.—The *American*, N. Y.



SINGER MIDGETS IN THE ZOOLOGICAL PARK

A page from the land of "Lilliput," with Mr. C. C. Egan of Keith's Fordham Theatre in the character of the immortal Swift's Lemuel Gulliver. Beside our big male Nubian Giraffe, how astonishingly like the tiny people created by Swift in the land of Gulliver! These charming little people enjoyed a very happy afternoon in the Park on May 15, 1924.

Photograph by Elwin R. Sanborn.

