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# ZOOLOGICAL SOCIETY BULLETIN

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A GIANT POLYPOD'UM FERN

Some of the fronds of this fern are over eleven feet long

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# ZOOLOGICAL SOCIETY BULLETIN

*Published by the New York Zoological Society*

VOL. XIX.

JANUARY, 1916

NUMBER 1

## THE RODENT COLLECTION IN THE REPTILE HOUSE

*By* RAYMOND L. DETMERS.

ABOUT eight years ago, while the writer was making a tour of the zoological parks and gardens in the United States he noted in one of these collections an attempt to exhibit a series of the smaller rodents. The animals were in glass cases, and provided with sleeping boxes or bunches of cotton wool. In not a cage was a specimen visible and the only indication of the species represented was in the explanatory matter on the labels.

Two years later, while on a similar trip among the zoological collections of Europe, several series of rodents of like arrangement were noted. The advice elicited was to the effect that while the smaller rodents were of interest from their markedly varied form and coloration, the practicability of using up space in an endeavor to exhibit them was very doubtful. This condition resulted from the following difficulties: 1. The nocturnal habits of the greater number of species, resulting in persistent hiding in the nests during the day. 2. The short lives of most of the species, owing to improper environment and lack of exercise. 3. The difficulty of obtaining new specimens. This latter condition was due to a general lack of interest among animal dealers in the very small mammalia.

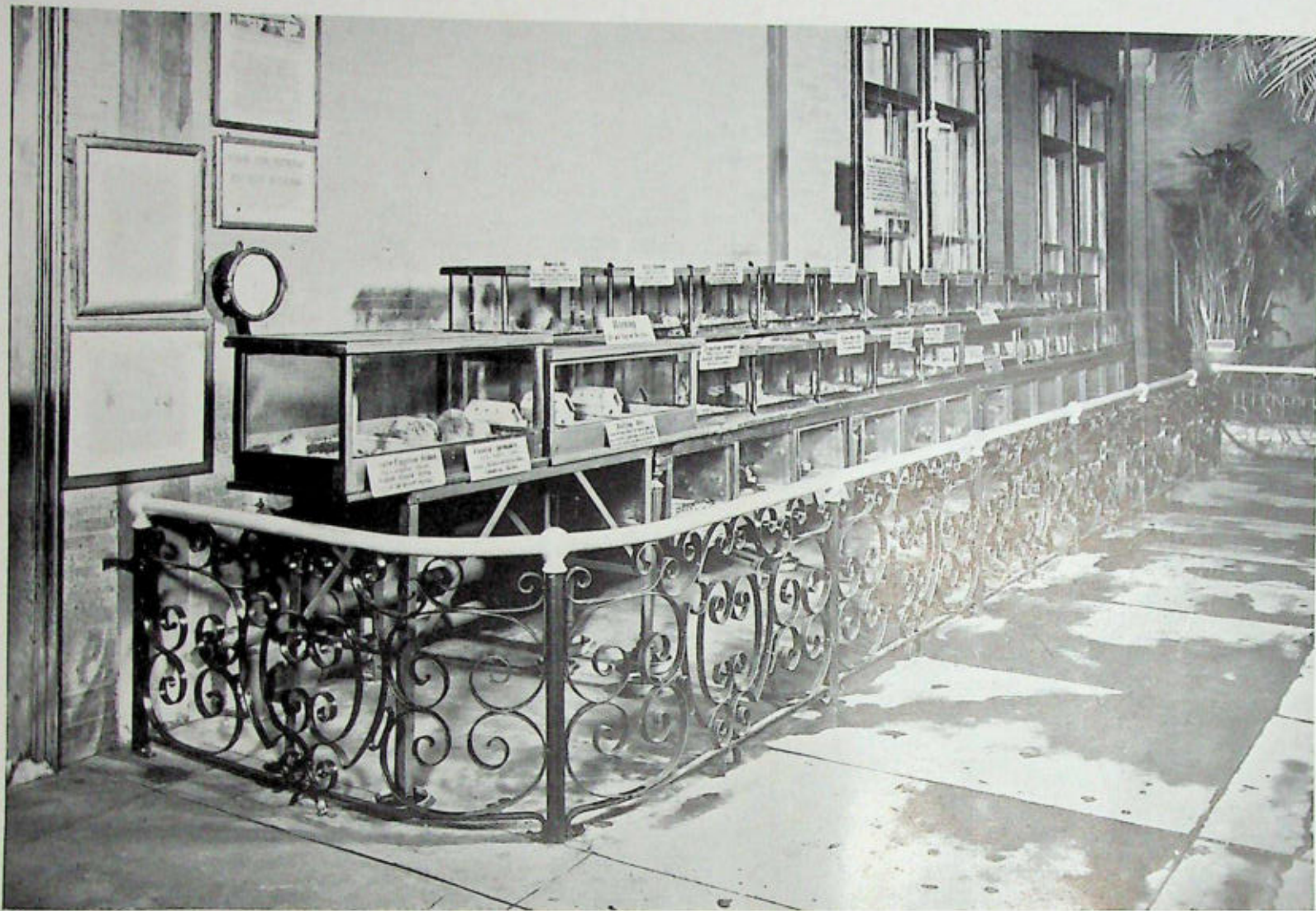
After these preliminary observations of other attempts to exhibit the smaller rodentia, the writer determined upon a series of experiments in the New York Zoological Park, for the purpose of successfully exhibiting a varied series of the gnawing animals, but in such a way that the specimens could be *seen*, and at the same time kept in good health, and enabled to live a reasonable length of time.

The first series of animals for our experiment consisted of several species of spermophiles, kangaroo rats and miscellaneous mice. Thus the experimental group embraced both nocturnal and diurnal species.

As it was realized that the nocturnal species would retire within sleeping boxes during the day, their shelter was in the nature of a scant handful of hay. It was believed that without some kind of a shelter from observation, they would be excessively nervous and soon would die. The cages of the diurnal species were provided with about six inches of packed earth, to provide them exercise in burrowing. The cages were of a type commonly known as "terraria," with four glass sides, the glass sliding in grooves. Each case was provided with a top of fine wire netting or screening.

Our early experiments with these cages taught us many things. The nocturnal rodents so skillfully collected their hay in corners that when they crouched motionless beneath the nesting material their bodies could barely be seen. With the diurnal species there was an immediate tendency to dig burrows in the earth, and remain under cover the greater part of the day. The four glass sides and mesh tops of the cases were found to be a poor arrangement for proper ventilation. Moreover, it was difficult to clean the inside of the glass. When the cover was slid to one side, even though ever so carefully, the more nervous specimens were liable to leap up to the sides and escape.

It was by frequent changes of this experimental series of cages that we evolved a satisfactory and valuable exhibit of rodents. We now have a large series of cages, about fifty in



RODENT-REPTILE COLLECTION IN THE ZOOLOGICAL PARK

number, and in them the specimens are at all times in view. We have also established surprising records of the longevity of certain species as captives.

The principal difficulty encountered with the rodents was the tendency to make nests in corners; and thus hide from observation. This was met by cutting up the hay bedding. It was put through a cutting machine, and reduced to sections about three-quarters of an inch long. With this chopped medium the animals were unable to make a nest, although they would scoop up a mound of it in a corner, using the concave center of this as a base to which they returned after all trips about the cage. The temperature of the exhibition hall (75° F.) was such that warmth in bedding was not really necessary. This is a condition that *never* should be overlooked in providing for the comfort of small mammals in captivity.

Real shelter having been thus eliminated, the writer was doubtful as to whether or not the more timid species would fare well. After a number of weeks that anxiety ceased. In the changes that were observable, the condition of the specimens was improved by the ventilation brought about through the removal of long fibre nesting materials. The pelage of all the specimens appeared fuller, and of better lustre.

The ventilation of the cage was then improved by removing the back panel of glass, and substituting fine wire netting. A sliding panel was then attached to the mesh cover of the cage; and through this the keeper in charge could reach any portion of the interior in placing feed and cleaning glass without fear of the animals escaping, as the man's sleeve closed the orifice. The writer believes these studies of the needs of small rodents, and the practicability of really showing them to our visitors, have resulted in the best possible cage for the exhibition of such animals.

As the rodent collection now stands, the animals are kept in cases twenty-two inches long, twelve inches wide and twelve inches in height. We have also found that these dimensions are in many cases sufficient to enable us to insert glass partitions, thus increasing the number of compartments. We use shelter boxes only in those cages where litters of young are being reared. Several illustrations accompanying this article demonstrate the cage arrangement and construction, and the method of labeling the collection.

It is not always the largest animals that are of most marked interest or economic importance. If the smaller species can be shown in a manner

that quickly engages the visitor's attention, something worth while has been accomplished. It is among the rodents that we find animals of great importance to man, both from the economic point of view in the damage they do, from the spread in infectious disease, and because of the commercial use of a few.

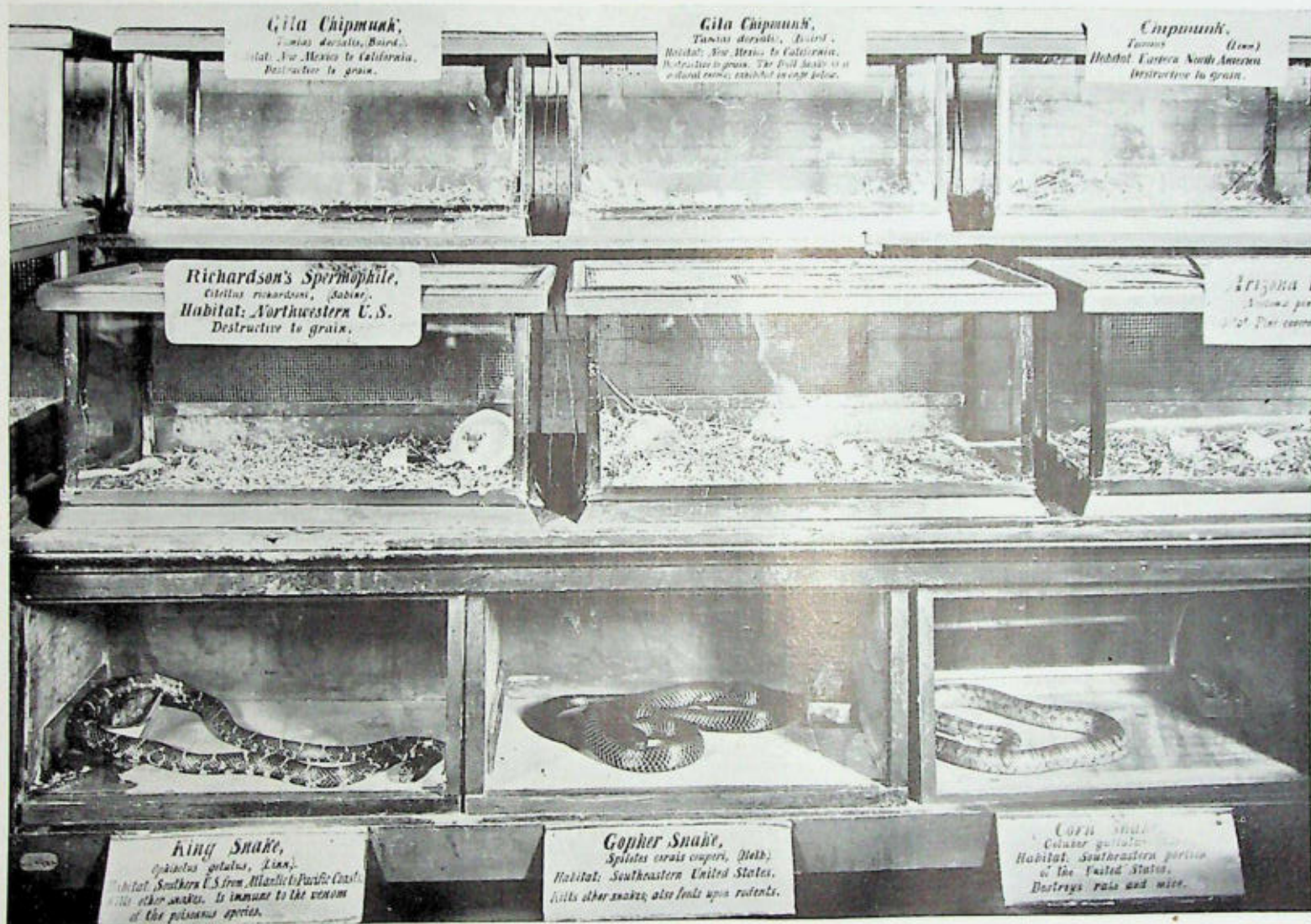
To add to the value of the collection of rodents we have arranged in close proximity a series of glass-fronted cases containing those species of snakes, principally North American, that are of real value as destroyers of the noxious gnawing animals.

From the interest evinced by our visitors we would say that the collection described is very desirable in a collection of living zoological specimens. The expense in cage construction is very small, averaging slightly over two dollars per cage; there is a great variety of animals, and the specimens themselves, involve but slight cost in purchase. To obtain the necessary specimens is, however, no easy matter. The greater number of these come from collectors and trappers who make a specialty of capturing small specimens. Through eight or ten years' correspondence we have located various parties engaged in this work, and now we are able to keep the collection at a uniform standard of interest and importance. Fortunately, the shipping of specimens is not a difficult matter. Rodents travel safest in tin cases, properly ventilated, of course, and when supplied with a variety and abundance of food they require no attention for a week or more of travel.

Owing to the ability of rodents to live for lengthy periods without water (if supplied with vegetable food), their safe transportation is greatly facilitated. Some of our most valuable specimens have been eight or ten days en transit in tin pails with perforated covers wired on to their tops.

Among the particularly interesting species now on exhibition are the Indian Jerboa (*Alactaga indica*), Egyptian Jerboa (*Dipus aegyptius*), Egyptian Desert Mouse (*Meriones crassus*), Porcupine Mouse (*Acomys cahirinus*), and the European Marmot (*Citellus citellus*). Among the New World species are the Bushy-tailed Wood Rat, often called the Pack Rat (*Netoma cinerea*), Arizona Wood Rat (*Netoma pinetorum*), Western Gopher Rat (*Thomomys fulvus*), Gila Chipmunk (*Tamias dorsalis*), Western Chipmunk (*Eutamias quadrivittatus*), and the Flying Squirrel (*Sciuropterus volans*).

Owing to our system of regularly feeding all of these rodents during the middle of the day, and limiting the amount of food so that it will



SECTION OF THE RODENT-REPTILE COLLECTION

This picture illustrates the use of the descriptive labels and the arrangement of the orders and various specimens.



KANGAROO RAT



EGYPTIAN JERBOA

be quite consumed before the next feeding hour, we have brought about a condition of diurnal activity. Prior to a given feeding time the entire collection is active, which results in all its members being displayed most satisfactorily. At such times it is interesting to note such strictly nocturnal creatures as the jerboas and flying squirrels moving about their cages in lively fashion.

The excellent condition of the rodents series is largely attributable to the devoted attentions of Keeper George Palmer. It is rather difficult to find men sympathetically interested in the very small animals, but Keeper Palmer has shown unflagging interest and care in studying and ministering to the wants and ways of his small subjects. Many of the cages, and all of the nesting boxes and accessories, were built by him in a work shop at the Reptile House. The food supply of the collection is inexpensive. It includes carrots, celery, lettuce, stale white bread, whole and cracked corn, sunflower seed, and the small seeds most commonly used as bird food.

It is important to note the degree of popular interest in this collection, aside from the more

systematic interest of those actually engaged in the study of animals. At any time of the day a glance at the rodent series will show a number of the animals alert and moving. The big pack-rat may be gathering mouthfuls of cut hay, or carefully carrying bread cubes from one corner of his cage to another. Noting some disturbance in his small world, he vigorously stamps his feet, then ostentatiously clears a space about him by shoving away the hay with his forefeet, as if preparing to fight. In a nearby cage several desert spermophiles turn endless somersaults by running up the glass panel, and leaping downward from the top. In the cage next to them are the vigorous and vividly striped California chipmunks. Some of the rodents play like kittens, and from various cages come cheery whistles, chirps and chattering. Among the spermophiles there are several species that are remarkably bird-like in their calls.

We have devoted a small group of cages to remarkable color phases of domesticated mice. Here may be seen a number of interesting types of albinism. The most striking of these are the breeds known as "pink-eyed fawns" and



THIRTEEN-LINED SPERMOPHILE



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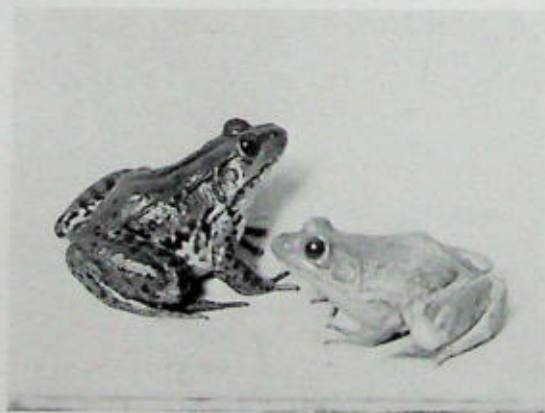
"pink-eyed lilaes." The former is a pale brown mouse, with the gleaming pink eyes of the perfect albino, while the latter is a purplish-maltese animal. To the average visitor the most interesting among the domestic breeds are the so-called "waltzing" mice. This animal has been bred with a view to the deterioration of that part of the brain that relates to equilibrium and direction. They spin or "waltz" in such incessant and rapid gyrations that sawdust and hay particles fly from the scene of action, and the animal "dances" in a perfectly cleared space.

#### AQUARIUM PATHOLOGIST.

Dr. George A. MacCallum, of the College of Physicians and Surgeons, has been appointed Pathologist to the Aquarium.

#### BOARD OF MANAGERS' MEETING.

The Annual Meeting of the Board of Managers will be held at the Down Town Association on Tuesday, January 18, 1916, at 3 o'clock P. M.



ALBINO FROG

Photographed with common color phase to show the marked difference.

#### AN ALBINO FROG.

By RICHARD DECKERT.

**A**LBINOS, or animals lacking color pigment in their structure, are not rare. Animals like the rabbit, guinea pig, rat and mouse have been deliberately bred to albinism for hundreds of years. Occasionally an albino horse, dog, raccoon or opossum is met with,

and among birds, geese, ducks, pea-fowl, guinea-fowl, crows and sparrows there often are true albinos.

Among reptiles, albino specimens of the milk snake, garter snake and alligator have been exhibited in the Zoological Park Reptile House. This year we are able to exhibit, for the first time in the United States, an albino frog. This interesting rarity, for such it surely is, was captured by Henry Snyder, the son of our Head Keeper of Reptiles, at Searsdale, Westchester County, New York, and by him was presented to the Zoological Park.

When this specimen first was seen with some normally colored green frogs, it was thought to be a diseased specimen, but the young collector wisely considered it worth while to take home the specimen and show it to his father. Mr. Snyder immediately realized the rarity and importance of the find. Out of the thousands of frogs that during the past fifteen years have been caught for our reptile collection, no one who has caught and otherwise handled many thousands of frogs for quite a number of years, ever previously has secured an albino specimen. The writer has recently examined all available records, and has failed to find any mention of an albino frog having been caught in the United States. Europe can show records of several species of frogs and toads in which albinism occurs from time to time, but this is the first specimen recorded for America.

The specimen referred to is a common pond frog, (*Rana clamitans*) such as may be found in almost any brook, ditch, pool or freshwater swamp. Its color is a waxy yellowish white on all upper surfaces, and milky-white underneath; the eyes are brilliant red, with a narrow gold rim around the pupil. Our specimen is a female about two and three quarter inches in length of head and body, and therefore not quite adult. At first it was very timid, darting around its cage with nervous agility, bruising its head against the screen top and glass sides whenever anyone came near it. After nearly three months of captivity, however, it has lost its nervous fear, and will come from its hiding place under the moss provided for it and hunt the roaches, mealworms and earthworms which form its food. It will also sit for hours on a large flat stone in the center of its cage, apparently quite content with its surroundings.

Of course this frog is enjoying special care, and we look forward to keeping it for a reasonably long time.



UTINGA JUNGLE

## EXPLORING A TREE AND A YARD OF JUNGLE.

By C. WILLIAM BEEBE,  
Curator of Birds.

### I.

AN oblique glance will sometimes reveal more vital things than a direct gaze. As with vision so I found it in my occupations during a fortnight spent in Pará, Brazil. As I have already indicated,\* my principal motive was to superintend the assembling and transportation to our Zoological Park of a considerable portion of the animals and birds in the Pará Zoo. With the arising of many unexpected difficulties, it seemed as if this undertaking would not leave me free for a moment. The party not in power even took it up as a political issue, and the newspapers were filled with excited editorials condemning our presence and object. But these things settled themselves, and at calm intervals I took a tram to the suburbs, and chose Utinga as a base for jungle work. Utinga is a large tract of jungle, restricted from public occupation in order to protect the water-works station. For a day or two

I roamed aimlessly about, shooting any interesting birds I came across in the usual collector's fashion. Then I realized that if any worthwhile results were to be achieved, it was only by restricted, intensive observation. This I carried out in two ways.

### II.

On the first tramp I took in the jungle I noticed a number of small birds in the upper branches of a tree which grew alongside of a trail near our camp. When I had passed that way several times I realized that this particular tree had some powerful attraction for birds of many species. Knowing the shortness of time at my disposal I determined to concentrate my efforts on this wild cinnamon, called by the natives *Canella do Matto*.

Once having my attention called to this bird tree, I kept on the watch for others. Several hundred yards away I discovered a real giant, towering high above all the surrounding growth. This I named the Toucan Tree as it appeared to be especially attractive to these birds. It was covered with an abundance of good-sized scarlet fruit, the size of which accounted for the presence of medium and large birds, such as toucans, caciques, trogons and kiskadees, instead of smaller callistes and flycatchers. A third berry-laden tree half a mile to the eastward straight through the jungle, bore oblong, yellow-skinned fruit, appealing especially to woodpeckers and flycatchers, and from brief glimpses in passing, the constant abundance of birds would have furnished as interesting a list as at the tree near our camp.

I began my study of bird life in the wild cinnamon tree by stealthy approaches, working my way through the jungle until I was close underneath. I soon found that this was quite unnecessary, as the birds among the upper branches paid no attention either to me or the sound of my gun. Three hours of constant observation beneath the tree resulted in many hours of pain from strained neck muscles. On the third day I brought out a canvas steamer chair and placing it in the trail at a convenient spot, found it to be ideal for observation. I could recline so that looking straight upward was no effort. With gun on my knees, glasses around my neck, note-book and dead birds on a stump within reach, I had discovered a truly *de luxe* method of tropical bird study. The biting flies, gnats and mosquitos made it impossible to sit absolutely quiet for more than a minute, and the ants soon found that the legs of the chair gave easy access to one's person.

\*Zoological Society BULLETIN, July, 1915.

On the whole, however, I was too much absorbed in the novelty of the method of work and its unexpected results to give any thought to the annoyances.

The principal jungle flower was the heliconia, whose scarlet, jagged spikes glowed brightly against the dark foliage. Variegated leaves were abundant and when the slanting sun struck through the jungle, it often appeared vivid with color. Black capuchin monkeys of more than one species were occasionally seen and I saw as many as nine in a band. Three-toed sloths were common as were agoutis and small squirrels. But during my periods of watching, no mammal came near the tree. The more common sounds were the usual ones of light jungle. Tinamou called and answered one another, gold-birds lifted their wonderful voices far away in the forest, toucans yelped, caciques squeaked and gurgled overhead, cicadas shrilled and buzzed and great bees and hummingbirds whirred past. After the daily rain, tiniest of frogs would each strike up a single, shrill note, unceasingly reiterated.

My business was chiefly with the birds which I could observe from my canvas seat. I spent from two to six hours each day for a period of one week in the immediate vicinity of the tree and during that time identified ninety-seven species of birds, none of which were more than a few yards from the trail. A further division of these is as follows:

Aerial species flying overhead .....	7
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Birds observed in the tree.....	76

Of the seven aerial species, one was a vulture, one a nighthawk, one a swift and four were swallows. These all came into view at one time or another across the patch of sky visible beyond the upper branches of the tree. Now and then birds of prey appeared, but at such great elevations that I was unable to identify them.

The fourteen birds of the surrounding jungle may be divided thus: One tinamou, dove, woodpecker, kingfisher, trogon, ani and woodhewer; two antbirds, two flycatchers and three finches. In one or two instances these were birds of adjoining fields which had strayed a little way into the undergrowth. The majority, however, were typical of the lower jungle strata, either terrestrial or living in the low undergrowth.

This series of strata of bird life visible to me as I sat quietly, hour after hour, was very striking, a phenomenon which would never come to one while moving about through the jungle. Bound to the ground were the tinamou, and

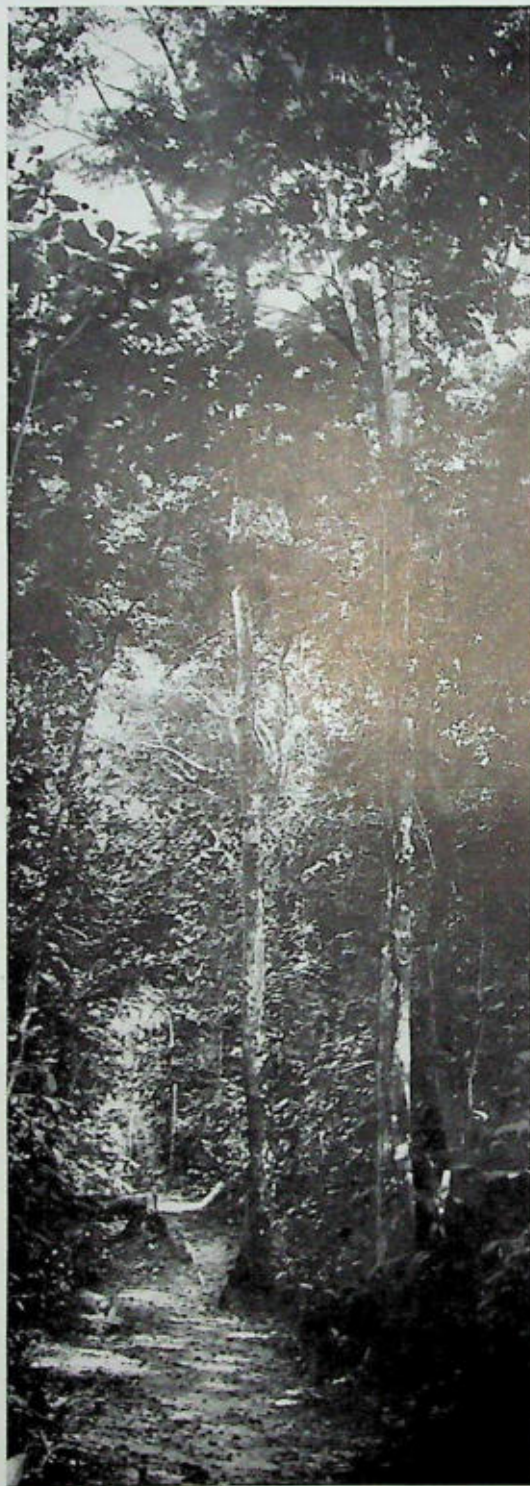
almost as terrestrial were the rustling ground doves. In the lower underbrush finches, sylvialaxis and antbirds moved restlessly; a little higher, manakins whirred about and woodhewers hatched up the trunks. Then came the birds of the upper branches—callistes, tanagers, flycatchers, toucans and parrakeets. Then the low fliers—the swallows, martins, swifts and night-hawks and finally the vultures, hanging like the faintest of motes in the sunlight high above the earth.

The tree was smooth-barked, richly decorated with lichens and while only about fifteen inches in diameter at a man's height above the ground, it was very tall in proportion. The first branches were small, mostly dead and about sixty feet up. From this point the trunk split into lesser divisions and lifted its topmost foliage into the full tropical light and heat a hundred and ten feet above the ground. The berries were small, round and three-parted and, like the leaves, slightly acrid, with a spicy, aromatic flavor.

A few minutes after dawn I have counted eight birds in the tree and a half dozen would sometimes linger until dusk. As a rule, however, there were few in sight until 7:30 or 8:00 A. M., after which there would be a continual coming and going until the heat of mid-day drove all to shelter. The larger number of afternoon visitors came after the rain was over. Sunshine had much to do with the presence of the birds, and a cloudy half-hour meant but scant notes as I sat beneath. With the reappearing of the sun, the birds would again begin to flock from the surrounding jungle.

Abundance of species and relative fewness of individuals is a pronounced characteristic of any tropical fauna. This was beautifully shown by my first two days' collection from the tree, collecting, too, which was quite indiscriminate in character, very different from the more careful picking and choosing with which I shot on succeeding days. The first day I secured sixteen birds, all of different species. The second morning I got fourteen, all different, and only one of which was represented in the lot of the previous day. Thus in five hours' time I secured thirty specimens of twenty-nine species. From the entire district of Pará, three hundred and seventy-nine birds have been recorded. In this single tree within a week's time and during a period of intermittent observation I found seventy-six species.

The bird visitors to the tree arrived in one of two characteristic ways. Many came direct and swiftly, singly or in pairs, flying straight and with decision as if from a distance. A



THE CINNAMON TREE OF THE BIRDS  
In the Utunga Jungle.

hundred yards away in any direction this convergence could frequently be observed, small birds flying over the summit of the jungle, revealing a general flight direction treeward. Another method of arrival was wholly casual, loose flocks drifting slowly from the neighboring jungle, sifting into the tree and feeding for a time before passing on. When these left it was rather hastily and in answer to the chirps and calls of the members of their flock who had not been beguiled by the berry attraction of this tree and hence had forged steadily ahead. These more or less well-defined flocks are very typical of all tropical jungles. Little assemblages of flycatchers, callistes, tanagers, antbirds, manakins, woodhewers and woodpeckers are drawn together by some intangible but very social instinct, and unite day after day in these fragile fraternities which drift along, gleaning from leaves, flowers, branches, trunk or ground, each bird according to its structure and way of life. They are so held together by an invisible gregarious instinct that day after day the same heterogeneous flock may be observed, identifiable by peculiarities of one or several of its members. The only recognizable bond is vocal—constant low calling, half unconscious, absent-minded little signals which keep the members in touch with one another, spurring on the laggards, retarding the over-swift.

While I watched, there came to my tree one species of pigeon, two hawks and two parrots, four hummingbirds and an equal number of toucans and woodpeckers. Fifty-nine were passerine birds of which there were eight each of the families of flycatchers, manakins and cotingas and eleven tanagers.

Besides the seventy-six which I positively identified by shooting or observation, I saw at least thirty or forty more species which eluded me, and of which a hasty glance told no more than that they were of new, and to me, unknown species. I have recorded the details of this list elsewhere.\*

At first I found it almost impossible to identify birds unless they were on the lower branches or silhouetted against patches of foliage. When in the upper branches and seen against the sky, birds with under parts of black, blue or green all looked black. White under plumage appeared grey and buff seemed orange. Even when the tree was filled with the most brilliant callistes, not a bird was visible as long as they were motionless, but when the smallest, most drab of flycatchers moved head or tail I could at once detect it, and distinguish it from the

\*Zoologica, Vol. II, No. 3.

moving leaves about it. Gradually I came to know all the more common species, beginning with the tail-flirting silver-beak tanagers, and before the end of my week's vigil, I seldom made the mistake of shooting a species with which I was already familiar.

The great abundance of birds in this particular tree was due of course to the multitude of ripe berries among its foliage. These were the primary cause of attraction. Lacking these, the birds would have had no special reason for visiting it more than the surrounding jungle. It was surprising to discover how many of the birds which usually are essential insect eaters, here had become chronically frugivorous.

Without exception all the flycatchers were enjoying the berries. This was not so surprising in the case of the six manakins and seven cotingas, but the three vireos and five honey creepers were indeed birds of adaptability thus to change their diet. The tanagers led all in numbers and gastronomic enthusiasm.

Little need be said of the casual visitors. A wren hunted insects among the upper branches one day, and on another a hawk found a giant snail crawling up the trunk and proceeded to devour it. The insect-eaters of the trunk were nine in number and showed no interest in the berry harvest. Two were woodpeckers and there were seven species of that interesting tropical family of woodhewers.

These latter are the very essence of protective coloring, and their habits of life make of them wandering bits of loose bark, yet because of their constant motion they are very easy to see even in the dim light of the under jungle. The moment they are quiet they vanish, and the keenest eye in the world could not recognize them. This similarity of dress is a remarkable feature of this whole family, big and little, short and long-tailed, with beaks blunt, sharp, straight, curved, thick or needle-thin. In these characters they differ, by these points they must know one another. But their pattern shows little variation. Their olives or browns almost invariably warm into rich foxy rufous on wings and tail, while over head and shoulders a shower of light streaks has fallen,—bits of sunlight fixed in down.

And so came to a close my rambling observations on the bird life of this single *Canella do Matto*. Within the space of a week I had spent not more than twenty hours of neck-racked, vertical observation, shooting whenever necessary, holding up my glasses until my arms collapsed with fatigue. In return I had been able definitely to identify seventy-six species and

to record the presence in the tree of at least one hundred. In point of actual numbers I kept no sustained record, but during one vigil of two hours' length I counted four hundred and sixteen visitors to the tree.

When I began I had no conception of such success and as I look back and realize the necessary desultory character of my observations, the list seems even more remarkable. Relay observation on the part of two or three watchers for a correspondingly greater length of time, or closer watching from a blind fixed in a nearby tree, would yield notes of incomparably greater thoroughness and value.

### III.

On the last day of my stay, as I was about to leave Utinga, I concentrated my attention on the tree and the surrounding jungle, endeavoring to fix it indelibly in my mind. I realized that in a few minutes I should leave this place with which I had become so intimate, and should very probably never return. I had demonstrated a remarkable concentration of bird-life when attracted by the ripened fruit of a single jungle tree. It was the unparalleled insurgence of such a variety of organisms as can occur only in the tropics.

Now that there remained only a brief space of time I tried to conceive of some last thing I could do, to re-emphasize this important phase of tropical life.

As I walked slowly up the trail toward the tree I heard a rustling among the leaves at one side, and in deep shadow beyond a dense clump of scarlet *Heliconias* I made out a Tyrant Antwren scratching with all its might. To the kicking power of its small legs it occasionally added sudden flicks with the bill, given with such nice judgment and power, that it flung leaves larger than itself into the air and backward quite over its body. I had often wondered of what the food of these birds really consisted. Anyone could glance at the contents of a crop and gizzard and label it "small insects." But the actual details of this varied bill of fare, except in the case of very recently swallowed objects are merged and lost in the comminuted mass of legs, elytra and antennae.

Acting on this hint I brought from my camping stores an empty war-bag, and carefully scraped together a few handfuls of leaves, sticks, moss, earth and mold of all sorts. From directly under the *Canella do Matto*, I gathered four square feet of jungle debris, filled my bag and shouldered it. Then I said adieu to my

trail and my tree, a sorrowful leave taking as is always my misfortune. For the bonds which bind me to a place or a person are not easily broken.

In this case, however, the bond was not altogether severed, and a week later when the sky line was unbroken by land, when a long ground swell waved, but did not break the deep blue of the open sea, I unlaced my bag of jungle mold. Armed with forceps, lens and vials I began my search. For days I had gazed upward; now my scrutiny was directed downward. With binoculars I had scanned without ceasing the myriad leaves of a great tree. Now with lens or naked eye I sought for signs of life on an infinitely smaller scale; the metropolis of a fallen leaf, the inhabitants of a dead twig. When I studied the tree-top life in the lofty jungle I was in a land of Brobdingnag; now I was verily a Gulliver in Lilliput. The cosmos in my war-bag teemed with mystery as deep and as inviting as any in the jungle itself.

When I began work I knew little of what I should find. My vague thoughts visualized ants and worms, and especially I anticipated unearthing myriads of the unpleasant macuins, or *bête rouge*, whose hosts had done all in their power to make life in the jungle unhappy.

For ten days or more on the steamer trip north Mr. Hartley and I labored over the jungle debris. After two hours of steady concentration our eyes rebelled and we had to desist. It seemed at times as if the four square feet had increased to forty, but the last handful was finally sifted and teased to shreds. Our method of work was to place a small pile on a newspaper spread on a table under the skylights of the smoking room, and with forceps and dissecting needle to search carefully every surface of leaf and frond and to split every twig and stem.

It was found that the safest way to capture the minute creatures which crawled or hopped about, was to wet a small brush in alcohol, touch them with the tip and float them off in the liquid in a very small vial. Thus they were uninjured and we could pick them from a mass of earth or fungus without including any of the debris itself. Usually we worked with our naked eyes, but occasionally hunted over a particularly rich field with low-power dissecting lenses.

Day by day our vials increased. Scores of creatures evaded our search. Many others, of which I had captured a generous number, I allowed to escape. My lilliputian census was far from the mere aggregation of ants and worms which I had anticipated, and a review of the

whole showed that hardly any great group of living creatures was unrepresented.

Two objects indicated the presence of wild mammals. First a bunch of rufous hairs which in size, color and minute structure were identical with those of the common agouti, which was very common at Utinga. I also found sign of this rodent. Man, himself, was represented by two wads which had dropped from my gunshots sometime during the week. One had already begun to disintegrate—wet, half decayed and inhabited by half a dozen tiny organisms.

Five feathers were the marks of birds, also doubtless the result of my study during the week. A body feather and two primaries from a sparrow-like bird were indeterminate, but two brilliant, green plumes came without question from the body of a calliste. Of reptiles there was a broken skull of some lizard, half disintegrated, with a few of the teeth still left. There was, besides, the small egg-shell of a lizard which had hatched and gone forth to live its life elsewhere in the jungle. A third reptilian trace may have been his nemesis—a good-sized shred of snake-skin. The group of amphibians was present even in this small area of four square feet—a very tiny, dried, black and wholly unrecognizable little frog. Fishes were absent, although from my knees as I scraped up the debris, I could almost see a little igarapé in which dwelt scores of minnows.

As I delved deeper and examined the mold more carefully for the diminutive inhabitants, I found that this thin veneer from the floor of the jungle, appeared to have several layers, each with its particular fauna. The upper layer was composed of recently fallen leaves, nuts, seeds and twigs, dry and quite fresh. As yet these showed but little change, and only the damage wrought by insects and other agencies while they were still on the trees. In this layer were small colonies of ants in hollow twigs and occasional huge solitary ones. Here lived in hiding small moths, beetles and bugs awaiting dusk to fly forth through the jungle. The lowest layer was one chiefly of matted, thready roots holding together compact masses of earthy soil, mixed with a large proportion of tiny bits of quartz. The animal life of this stratum was very meagre, occasional mites—especially red ones—and a few earth and round worms. The latter were in much fewer numbers than in the middle layers.

Between the upper and the middle layers were sprouting nuts and seeds, with their blanched roots threaded downward into the rich dark mold, and the greening cotyledons curling



GIANT LAND SNAIL.

upward toward light and warmth. Thus had the great *Canella do Matto* itself begun life. In my war-bag were a score of potential forest giants doomed to death in the salt ocean.

The middle layer, finally, was the all-important stratum. In it lived four-fifths of the small folk. This was composed of debris in full course of disintegration. Leaves, sometimes partly green, usually brown or black, nuts half decayed, twigs half rotten. All still preserved their form, although some were ready to fall apart at a touch. All were soaked through, or at least damp and soggy. Often four or five leaves would be stuck together, stitched with the threads of fungi. In such a haven was always a host of living organisms.

Some of the half decayed leaves were very beautiful. Vistas of pale, bleached fungus lace trailed over the rich mahogany colored tissues, studded here and there with bits of glistening, transparent quartz. Here I had many hints of a world of life beyond the power of the unaided eye. And here too the grosser fauna scrambled, hopped or wriggled. Everywhere were tiny chrysalids and cocoons, many empty. Now and then a plaque of eggs, almost microscopic, showed veriest pin-pricks where still more minute parasites had made their escape. Contracting the field of vision to this world where leaves were fields and fungi loomed as forests, competition, the tragedies, the mystery lessen not at all. Minute seeds mimicked small beetles in shape and in exquisite tracery of patterns; small beetles curled up and to the eye became minute seeds of beautiful design. Bits of bark simulated insects, a patch of fungus seemed a worm, and in their turn insects and worms became transmuted optically into immobile vegetation. Scores of little creatures were wholly invisible

until they moved. Here and there I discovered a lifeless boulder of emerald or turquoise—the metallic cuirass of some long dead beetle.

Some of the scenes which appeared as I picked over the mold, unfolded suddenly after an upheaval of debris, were startling. When we had worked with the lens for many minutes, all relative comparisons with the surrounding world were lost. Instead of looking down from on high, a being apart, with titanic brush of bristles ready to capture the fiercest of these jungle creatures, I, like Alice in Wonderland, felt myself growing smaller, becoming an on-looker perhaps hiding behind a tiny leaf or twig. This feeling became more and more real as we labored day after day, and it added greatly to the interest and excitement. Close by would appear, under the lens, piles of great logs and branches protruding from a heaped-up bank of precious stones. Mauve, yellow, orange and cerulean hues played over the scene. Over a steep hill came a horned, ungainly creature with huge proboscis and eight legs, and shining, liver-colored body, all paunch, spotted with a sickly hue of yellow. It was studded with short stiff bristles, and was apparently as large as a wart-hog and much more ugly. It was a mite, one of the biting mites of the tropics, but under the lens a terrible monster. I put one of these on my arm to see if its bite corresponded to that of the legions of macuins which tortured us daily in the jungle. Under the lens I saw the hideous creature stop in its awkward progress and as it prepared to sink its proboscis I involuntarily flinched, so fearful a thing seemed about to happen.

In the middle layer, that of most active change, and surcharged with life, ants were abundant, together with small colonies of ter-



NEST OF SAUBA ANTS

mites. These were the only social insects, the twigfuls consisting of from five to fifteen members. All the other organisms were isolated, scattered here and there. Life in these lowly places, so far beneath the sunlight, is an individual thing. Flocks and swarms are unknown, and the mob has no place here. Each organism must live its life and fulfill its destiny single-handed. Even when two individuals were found together it was apparently more through accident of environment than from any gregarious instinct. In fact the same tropical law which holds good in regard to plants and the larger creatures of the sunlit world over-head applies here. I found numbers of different species, but very few collections of individuals of the same kind.

Flatworms were rather rare, but small, white ones were found now and then flowing slowly along in their characteristic manner over the surface of damp, half decayed leaves, as flatworms do the world over. Roundworms, small, white and threadlike, were present in equally small numbers. Earthworms of small size, one or two inches in length, were common. They moved slowly along in orthodox angleworm fashion until something alarmed them when they instantly became a maze of twisting, snapping curves, dancing all about in a most unwormlike fashion. The head and especially the collar were brightly colored, from reddish to an intense scarlet.

Centipedes and millepedes were common, all small, in keeping with the diminutive size of the other inhabitants of this little world. The largest centipede was less than an inch in length and scurried along on eighty-four legs. Very few were dark colored. Almost all were dead white, with yellowish brown heads and jaws. The larger millipedes were slow moving in spite of their abundance of feet, but small ones of various species were very agile, and slipped in and out of fungi forests in a most disconcerting way.

Scorpions were decidedly rare, and two small and one medium sized specimen were all I could discover. Pseudoscorpions, however, were abundant and conspicuous. I secured fifty, and could have taken three or four times as many. They would rush out excitedly when disturbed, and unlike all the other creatures of the underworld did not seek to hide. Instead they bravely sought open spaces, walking slowly and feeling ahead with their great pincer-tipped arms, which they brandished with the greatest ease although these weapons were as long as their entire body. When really alarmed, they scurried backward,

holding up their chelae in readiness. Their bodies were whitish, but their arms and pincers deep reddish brown. While there were several species, these superficially fell into two distinct types. The most abundant kind was pot-bellied, with heavy chelae, and was slow in movement. The other had a narrow, lighter body and very delicate slender chelae, and ran with great speed when alarmed. These, however, always ran forward, not backward like the others.

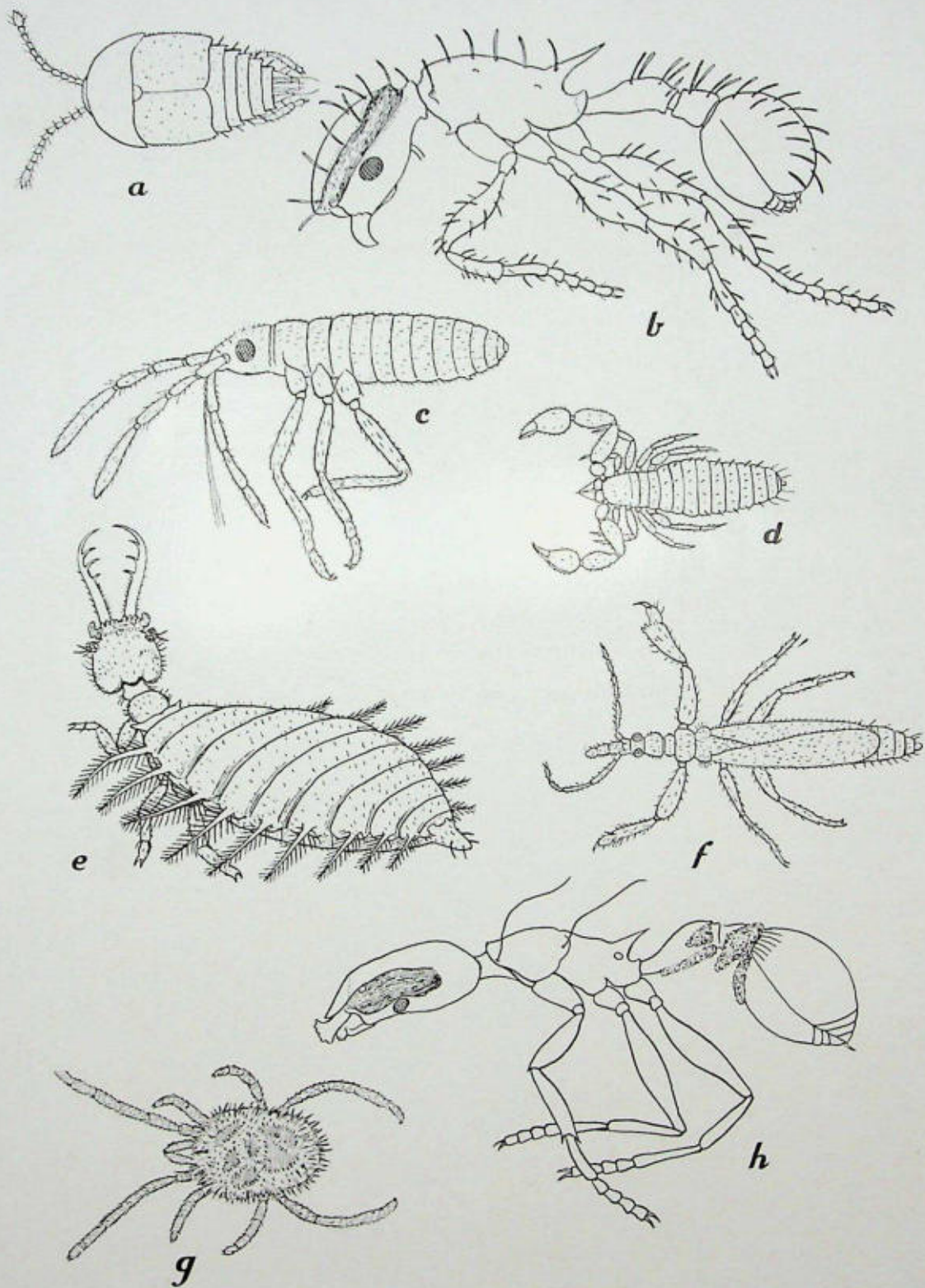
Harvest men were represented by a single daddy-long-legs which looked decidedly out of place among this dense debris. I rather fancy he was strolling on the surface when my onslaught bagged him and his surroundings.

Very small and very pale colored spiders lived in the middle layer in fair numbers. I saw about two score altogether. They were usually slow or moderately gaited, like their more abundant relatives, the mites. Only twice did I see a spider dash off with any of the speed which characterized those which lived in the jungle above ground.

Next to the ants the mites and ticks were the most abundant organisms. Hardly a leaf or bit of mold was free from them. I could have gathered hundreds. They were of many species and all colors, red, brown, purple, black and flesh colored. Some were naked and shining, others clothed in bristly hairs to their very feet. All were repulsive, slow, and so awkward that it was inexplicable how creatures with such lack of correlation could ever manage to find food, much less a mate. They were always crawling slowly along, tumbling over every obstacle in their path. Ticks were much rarer than mites.

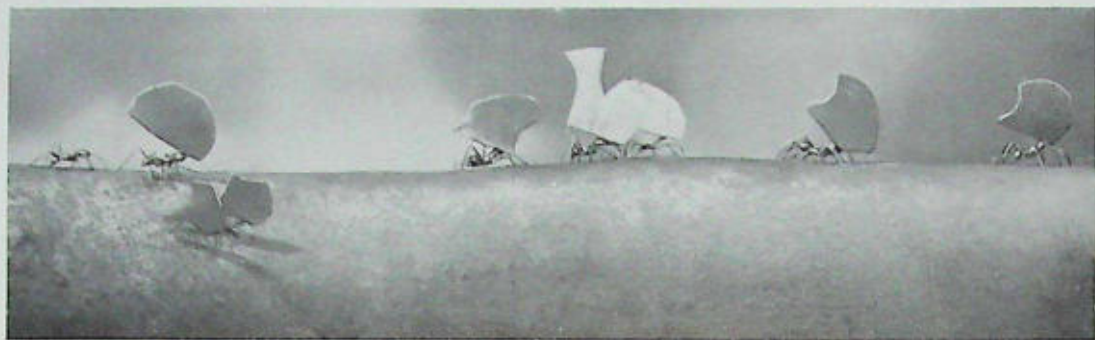
Numbers of very simple insects were common. Silverfish or Thysanura of several species ran out of their hiding places like active little ghosts, and scurried swiftly to another shelter which they fancied safer. Their nimble movements made them exceedingly difficult to capture. Collembolas, almost equally primitive, were usually white, but now and then a purple one appeared. Many of these primitive insects were not only capable of active running, but when the brush wet with alcohol was about to touch them, they leaped to a distance of twenty to thirty times their own length. Again and again this enabled them to escape. When they landed they remained motionless for some time and were most difficult to discover.

Termites, or "white ants," lived in small colonies of six to thirteen individuals in small



REMARKABLE INSECT FORMS, CHIEFLY NEW  
 Found in the surface of a Tropical "Yard of Jungle."

*a.* Unknown form. *b.* Worker of a new genus and species of ants. *c.* Unknown form. *d.* False scorpion.  
*e.* Unknown form. *f.* Unknown, even as to order. *g.* Mite. *h.* Worker of a new genus and species of ants.



PARASOL ANTS ON THE MARCH

twigs, in the upper layer of debris. Sometimes they seemed to be living in close association with real ants with no signs of hostility on either side.

A very few immature wood roaches represented the order Orthoptera, while the Hemiptera or true bugs had only a slightly better showing. Earlier stages of these insects lived in the middle layer, while those in the upper were quite adult and were ready to fly.

Beetles of small size were abundant and of numerous species. Of about fifty which I gathered, about sixty per cent were rove beetles. All the others were slow travellers, or on discovery pretended to be dead, but the rove beetles were very agile, and never lost any opportunity of trying to escape capture.

Some tiny flies had apparently just emerged from their pupae in the upper layer, these being the only representatives of their order, while of the Lepidoptera there were only two tiny moths among the dry leaves of the top stratum.

Ants were the most abundant form of life, both in numbers and species. They lived in the upper layers and with the exception of the great, black, solitary fellows who apparently had been walking about on the top of the leaf stratum, all were of small size. Their colonies were apparently complete but very small, a very minute twig being packed full of individuals from six to fourteen in number with a half dozen pupae. A careful examination of these ants has showed that there are no fewer than seventeen species, two of which are representatives of most remarkable new genera.

Finally mollusks were found in small numbers, all very small, some with flat shells, others with steeply turreted ones.

In addition to all these was a host of unknown forms, immature or in some unrecognizable early stage of development. Some had huge jaws and

the body encircled with a dense chevaux-de-frise of horny, frond-like spikes. Others were so simple that their relationships could only be guessed at. I have elsewhere gone into greater details of this host of small folk.\*

One thing was evident early in my exploration. I was having to do with a world of small people. No insects of large size were in any layer of the debris. The largest would be very small in comparison with a May beetle. Another fact which impressed me was the durability of chitin. The remains of beetles, considering the rareness of living ones, was remarkable. The hard wing cases, the thorax armor, the segments of wasps, eyeless head masks, all these still remained perfect in shape and vivid in color. Even in the deepest layers where all else had disintegrated and returned to the elements, these shards of death were like new.

Day after day as I worked with my face close to the mold, I was constantly aware of the keen, strong, pungent odor. It hinted of the age-old dissolution, century after century, which had been going on. Leaves had fallen, not in a sudden autumnal down-pour, but in a never ending drift, day after day, month after month. With a daily rain for moisture, with a temperature of three figures for the quicker increase of bacteria, and an excess of humidity to foster quick decay, the jungle floor was indeed a laboratory of vital work—where only analytic chemistry was allowed full sway, and the mystery of synthetic life was ever handicapped and ever a mystery.

Before the vessel docked we had completed our task and had secured over five hundred creatures from this lesser cosmos. At least twice as many remained, but in making calculations I estimated that the mold had sheltered a thou-

\*Zoologica, Vol. II, No. 4.

sand organisms that were plainly visible to the eye.

When I had corked my last vial and the steward had removed the last pile of shredded debris, I leaned back and thought of the thousand little creatures in my scant four square feet of mold. Then there came to mind a square mile of jungle floor with its thin layer of fallen leaves sheltering many more than six billions of these creatures. Then I recalled the three thousand straight miles of continuous jungle which had lain westward up the course of the Amazon, and of the hundreds of miles of wonderful unbroken forest north and south. My mind faltered before the vision of the unnamable numerals of this uncharted census, of the insurgence of life which this thought embraced. It seemed quite clear that no tyrant antwren need ever go hungry, as long as he had strength to turn over a leaf.

#### CHIEF ENGINEER MARTIN SCHENCK.

After sixteen years of service as Chief Engineer of the Park Department of Bronx Borough, Mr. Martin Schenck retired on January 1. Mr. Schenck's term of service, dating back to the year 1900, has embraced practically the entire period of the development of the Zoological Park. During that period the present institution has been created literally out of the raw materials. The total expenditure for improvements has been in the neighborhood of \$2,500,000, and it has included thirteen large buildings, besides small buildings, dens, aviaries, public entrances, comfort buildings, walks, roads and other features literally too numerous to mention.

During all that long period of strenuous labor, Mr. Schenck has acted as the engineer charged with the duty of serving as the intermediary and official check between the City of New York and the Zoological Society. Every contract awarded has been reduced to its final form and printed under his supervision. Every bid has been passed upon by him before an award has been made.

Throughout all that great volume of business, Mr. Schenck has faithfully and intelligently guarded the interests of the taxpayers of New York, and at the same time has promoted, and hastened by every means in his power, the program of the Zoological Society. In season and out of season, he has left no stone unturned to do his full duty by all parties, and avoid delays, mistakes, and troubles with contractors. In all contract difficulties that have arisen, Mr. Schenck has at all times courageously protected the interests of the City. At the same time, Mr.

Schenck has been reasonably generous to contractors, as well as just.

The Zoological Society notes with sincere regret the retirement of Chief Engineer Schenck. At the last meeting of the Executive Committee, the following resolution was adopted:

*Resolved*, that the Executive Committee of the New York Zoological Society learn with regret of the proposed retirement of Martin Schenck as Chief Engineer of the Park Department in the Borough of the Bronx. Mr. Schenck has acted in this capacity during the entire period of the construction and existence of the Zoological Park, and has been most helpful in promoting the interests of that institution. The committee has always found in him an efficient, faithful and devoted public official, and this record is placed on the minutes to express their appreciation of his long services to science and to the public.

On Thursday, December 23, at a luncheon given in honor of Mr. Schenck at the Rockingstone Restaurant by the officers of the Society and the Zoological Park, Director Hornaday presented to him, from the Society, as a small token of great regard, a handsome Sonora chime clock, and an album containing photographs of all the buildings that have been erected in the Park during Mr. Schenck's term of office.

#### NEW MEMBERS.

NOVEMBER 1, 1915—JANUARY 1, 1916.

##### LIFE MEMBERS.

Field, William B. Osgood, Baruch, Bernard M.,  
Worthington, C. C.,

##### ANNUAL MEMBERS.

Ader, Miss Ellen Louise,	Halle, Jacques S.,
Bates, Dr. W. H.,	Housman, Clarence J.,
Cahn, Arthur L.,	Skinner, M. P.,
Coster, Miss Sylvia deG.,	Walker, E. B.,
Eagle, John H.,	Zinn, George,

#### A GREAT GIRAFFE HEAD.

We have acquired, by purchase from Mr. James L. Clark, a magnificent mounted head of a male Uganda or Five-Horned Giraffe (*Giraffa camelopardalis rothschildi*), from the Uasin Gishur plateau, British East Africa, shot in 1908 by Mr. Godfrey Barker. An illustration of it is shown herewith, but the picture is unable to convey an adequate impression of the enormous size, the brilliant colors and the life-like mounting of the specimen. Pending better arrangements this head will be seen in the main hall of the Administration Building.



MUTE SWANS

At Belmar the swans are very tame, but the pair in the Park as yet are quite shy.

## MUTE SWANS.

A FINE pair of swans recently has been presented to the Zoological Society by the Borough of Belmar, New Jersey, through the kindness of Mayor Robert G. Poole and Mr. Wm. B. Bamford. These birds represent an interesting phase, the status of which is not perfectly understood. The common Mute Swan (*Olor olor*), the royal bird of England, is entirely white in plumage, with orange and black beak and black legs. The down of the cygnet of this bird is sooty gray, and the first true feathers acquired are of a similar hue.

The present birds, however, have feet of a grayish cast, and evidently are referable to the form known as the Polish swan. This phase was described by Yarrell, in 1838, as a distinct species, and given the name of *Cygnus (Olor) immutabilis*.

The adult bird seems to differ from the typical mute swan in no character except the color of the feet. But it is a curious fact that the young of the Polish swan is dirty when in the down, and sheds at once into snowy plumage.

Most modern ornithologists consider the Polish swan as simply a variety of the common form, perhaps modified by long breeding in captivity. It seems to be of Continental origin, the domesticated birds of England being of the black-footed type.

Belmar's success with swans has been quite remarkable. Fourteen birds were secured as a

gift, about 1910, and were placed on a large lake in the center of the town. Only nine became acclimatized, but the following year one pair nested and reared a brood of young. Other pairs followed, and the collection has grown to number more than fifty. In 1915, twenty-five young birds were reared, certainly the largest flock of cygnets ever brought to maturity in this country.

Just how many gray-footed birds were in the original lot is not known, but the present flock seems about equally divided between the two forms. They breed together indiscriminately, but the characters seem to retain their purity. The Polish swan certainly is not common among imported birds. The writer has never before seen it in this country, although it is fairly common in European institutions.

Belmar's lead has been followed by other towns in the vicinity, and at Bay Head, this year, a pair of swans reared four cygnets along the beach. These birds enjoy full liberty, and are a common sight on the wing about the bay. This acclimatization of swans is noteworthy, and its progress will be followed with interest.

L. S. C.

## NOTICE OF ANNUAL MEETING.

The Annual Meeting of the New York Zoological Society will be held at the Waldorf-Astoria on Tuesday, January 11, 1916, at 8:30 o'clock P. M.

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 ZOOLOGICAL SOCIETY BULLETIN
 

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## Departments:

<i>Mammals</i>	<i>Aquarium</i>
W. T. HORNADAY.	C. H. TOWNSEND.
<i>Birds</i>	<i>Reptiles</i>
C. WILLIAM BEEBE.	RAYMOND L. DUMARS.
LEE S. CRENDALL.	

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Published bi-monthly at the Office of the Society,

11 Wall Street, New York City.

Yearly by Mail, \$1.00.

MAILED FREE TO MEMBERS.

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ELWIN R. SANBORN,

Editor and Official Photographer

VOL. XIX, No. 1.

JANUARY, 1916

## OUR TROPICAL ZOOLOGICAL STATION.

Early in January the New York Zoological Society will embark upon a new scientific enterprise of a most interesting character. Mr. C. William Beebe, Curator of Birds, accompanied by three assistants, will sail for British Guiana, for the purpose of establishing in Georgetown, the colonial capital, a tropical zoological station, on lines absolutely new, so far as we are aware. The choice of a location has been made chiefly with reference to the amount of animal life available within a radius of 500 miles.

The prime objects of the enterprise are two in number.

The first is to secure ample facilities for studies of the evolution and life histories of birds, and various problems of avian development that can be studied successfully only with the aid of living material fresh from the jungle. This is no effort to make a catalogue of the species and sub-species of the birds of the Guianas, nor to make collections of skins. Mr. Beebe proposes to go back as far as possible toward the origin of the Class Aves, and throw light from new investigations upon subjects hitherto untouched.

Those who have followed Mr. Beebe's remarkable investigations in the Zoological Park will appreciate what it means to place him, with a corps of enthusiastic assistants, at the edge of a great tropical wilderness teeming with bird life, provided with all necessary facilities, and favored by the Government of British Guiana. There, if anywhere on earth, may we expect new light on the evolution of birds, and the life histories of strange species.

Take, for example, the hoatzin, with its strong presumption of tree-climbing ancestors. Up to

date not one living hoatzin, old or young, ever has reached a zoological park, or been studied alive in captivity. Mr. Beebe's laboratory will be within easy reach of an indefinite number of living and breeding hoatzins. Soon we will know more of this strange species; and it requires no strain upon the prophetic instinct to predict moving pictures of hoatzins at home.

The second object of the Laboratory and its staff will be the gathering of mammals, birds, reptiles, amphibians and insects for the Zoological Park, and fishes for the Aquarium. To this end Mr. Donald Carter will be taken from the Zoological Park force as Collector. In view of the great difficulty that always has attended the procuring in good health of mammals and birds from South America, the collecting function of the Laboratory will by some persons be regarded as its most important work. While we also have great expectations from that line of endeavor, and very much need the accessions, we feel that the scientific work to be done is of paramount importance.

Mr. Beebe has been fortunate in enlisting, as Research Associate, the interest and the self-sacrificing services of Mr. G. Inness Hartley, an ardent student of avian life who has generously volunteered to devote his entire time to research work with the Zoological Society.

Mr. Paul G. Howes, an expert in micro-photography and the intensive study of invertebrates will take a place in the Tropical Laboratory as Research Assistant.

The Government of British Guiana has generously offered the use of facilities in the Botanical Gardens, besides the privilege of importing apparatus and supplies free of duty.

The Trinidad Steamship Company has joined in promoting the whole enterprise by providing for the transportation of collections on most liberal terms, and co-operating in many matters of importance to the success of the enterprise.

Finally, five members of the Board of Managers of the Zoological Society have subscribed, on a basis of \$1,000 each, the entire sum necessary for the work of the Laboratory, during its first year. These gentlemen are Cleveland H. Dodge, Mortimer L. Schiff, C. Ledyard Blair, James J. Hill and George Jay Gould.

The element of novelty attaching to the Society's new scientific enterprise will focus upon it the attention of American zoologists. Already there are signs that a number of investigators will seek the hospitality that our tropical station will afford, and not the least of the pleasure and benefit to be derived from the station by our Society will be the satisfaction that can be

found in promoting the work of zoological investigators who never yet have enjoyed such an opportunity for getting close to animate tropical nature as this Station will afford.

W. T. H.

#### COMPLETION OF A WILD LIFE FUND.

On November 17, the Permanent Wild Life Protection Fund, to which several members of the Zoological Society have liberally subscribed, was completed to the minimum point of \$100,000, with an excess of \$1,345. The task of raising this very necessary endowment fund has occupied the attention of the Director of the Park throughout more than two years, and some of the difficulties surmounted were sufficiently great. "The times" for raising a large sum of money were mostly inauspicious; and but for sincere devotion to the cause of wild life protection on the part of seventy founders and subscribers, success would have been impossible.

During the four years prior to the summer of 1913, the Zoological Society had expended in the wild life cause about \$14,000, and the annual burden of it was a handicap on other activities which the Society wished to promote. The gathering of annual subscriptions had gone so far as to become wearisome to all concerned, and the only logical remedy was an endowment fund.

While the annual income of the new Permanent Wild Life Protection Fund is only about \$5,500, that sum, through the careful elimination of all those costly luxuries known as "overhead charges," will be sufficient to render a great amount of good service to the wild life cause. This fund is the second largest endowment fund for the protection of wild life, and all those who have made sacrifices to bring it into existence will find satisfaction in the thought that those sacrifices will bear fruit annually throughout the next 200 years.

W. T. H.

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#### CHARLES FREDERICK HOLDER.

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The untimely death of Prof. Charles Frederick Holder, at his home in Pasadena, California, on October 10, calls upon all the friends

of wild life in America to pause and pay tribute to his memory.

During an unusually busy life, Mr. Holder's activities touched the lives of hosts of intelligent people. His great array of popular books on various forms of wild life entertained and instructed a mighty army of readers, young and old. His leading and conspicuous part in establishing on fixed lines the high-grade ethics of angling was a service to the fraternity of American anglers that alone entitles him to distinction. His part in the development of angling for the "big game of the sea" opened to American anglers an entirely new world of thrilling sport.

Of Professor Holder's work as a teacher of the natural sciences in the Throop College of Technology, at Pasadena, the educational world well knows. Since his death a Holder Chair of Zoology has been endowed at Throop with a fund of \$50,000 as a permanent memorial of him.

During the last four years of Professor Holder's life his most important work was in the defense of the wild life of California. He made a gallant and partly successful fight for the adequate conservation of the food fishes of the California coast. In 1912, when the wild game of California was in peril from the attacks of market gunners and game-dealers, Mr. Holder organized the Wild Life Protective League of California, became its president, and throughout three long years of bitter warfare he made a fierce fight for the wild life of California. In all his campaigns he was successful! Even in 1914, when northern California went to the bad, the majority vote of southern California in support of the Flint-Carey law against the sale of game was over 57,000 votes! That splendid result was due chiefly to the leadership and the arduous campaign labors of Charles F. Holder.

In the campaign begun last September by the Zoological Society and the Permanent Wild Life Protection Fund, for national game sanctuaries, Professor Holder had prepared to take an active part; but Fate willed otherwise. He lived only long enough to be told of the success of the effort in southern California, and to hear the story of the tributes paid to him and his work from the campaign platform in Pasadena.

The Wild Life of America, the anglers of America, and the friends of wild life all have lost a good friend. May the records of his work and his achievements be a lasting example to his compatriots.

W. T. H.

## WILD LIFE PROTECTION.

By MADISON GRANT.

AT the Annual Meeting of members of the New York Zoological Society held at the Hotel Waldorf-Astoria, New York City, on January 12, 1915, the following action was taken upon motion of Dr. William T. Hornaday, seconded by Mr. Theodore Roosevelt:

"WHEREAS, it appears that the killing for sport and for food of game birds and mammals in the National Forest Reserves is destroying the wild life much faster than it is breeding, of many species is impending, now, therefore, be it

*Resolved*, That the New York Zoological Society recommends that the Federal Government take immediate steps to convert any or all of the forest reserves of the United States into game refuges, for such period and to such extent as is necessary to assure the preservation of threatened species, and the continuance of the game supply of the surrounding districts."

During the past year Dr. William T. Hornaday, Director of the Zoological Park, spent seven weeks in the west, visiting in the order named the states of Minnesota, Colorado, Wyoming, Idaho, Utah, Montana, Washington, Oregon, California, Arizona and New Mexico, to arouse public sentiment in favor of game sanctuaries in the National Forests. His trip was conducted at the expense of the Permanent Wild Life Fund, and was most successful in enlisting the support of governors and prominent citizens and the press of eleven western states. As a result of this trip legislation is in process of preparation, which has the support of the United States Forest Service and the Biological Survey, embodying the simple principle of the establishment of game refuges in the National Forest Reserves.

The Executive Committee of the New York Zoological Society at a special meeting held, December 17, 1915, took the following action:

"Be it resolved, That the Executive Committee of the New York Zoological Society now recommends and endorses the enactment of Federal legislation empowering the President of the United States, upon the approval of the Governors of each of the states concerned, to set aside perpetual sanctuaries for animals and birds from areas in the National Forests to be selected by the Secretary of Agriculture from lands unsuitable for agriculture or grazing; and be it further

*Resolved*, that the establishment of a large number of sanctuaries would best provide refuges for game to stock the adjoining country and furnish a permanent meat supply; and it is recommended

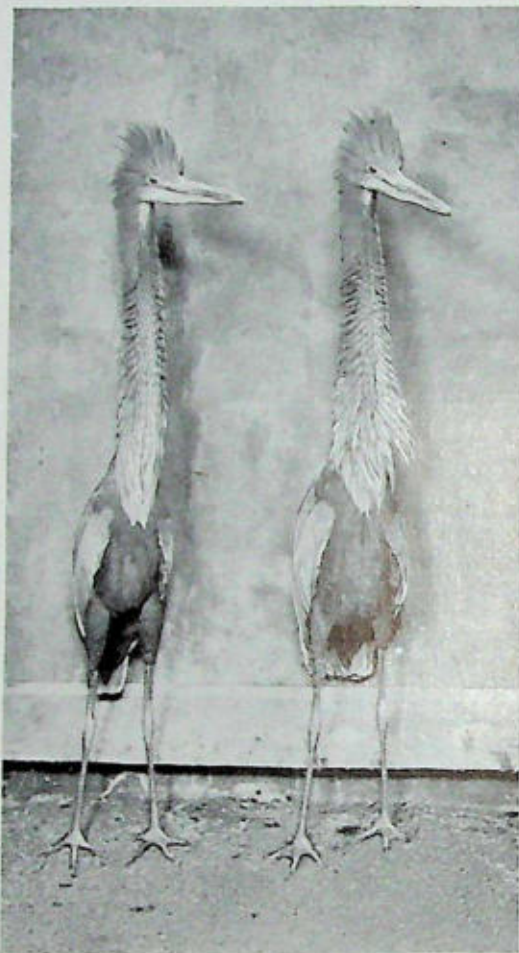
"That all unnecessary details of administration be so far as possible omitted from said bill, and be made the subject of future amendments based upon actual experience."

It was recognized by the Committee that many desirable features of the administration of such sanctuaries could be included properly in such legislation, but it was felt that all energies should be concentrated upon the establishment of sanctuaries, and that all the details of administration and of additional powers, such as providing for the acceptance of gifts of land from private individuals, should be left to future legislation.

No American, who has at heart the preservation of the remnant of our wild life, who desires to increase the supply of meat, or who desires to utilize at their highest efficiency lands belonging to the government and not suitable for other purposes, can fail to appreciate the great step forward in genuine civilization that would be accomplished by the proposed legislation. As yet there have been brought forward no objections worthy of the name, and there can be no serious opposition to the utilization by the government in the manner proposed of mountain tops or infertile hills or other waste lands.

The marvellous success of the Yellowstone National Park is an object lesson of the utmost importance. There would be little or no hunting in the adjoining states were it not for the continuous overflow of the surplus game from the park. Mountain Forest Reserves like the Bitter Root Forest Reserve in Montana, if sufficiently protected as is the Yellowstone National Park, would, as soon as the animals recovered their normal numbers, provide a continuous supply of deer, elk, and perhaps sheep to the adjoining states of Idaho and Montana. The destruction there may have gone so far in recent years that a complete restocking is necessary, but the game once re-established would provide sport and food for large areas now destitute of wild animals.

The New York Zoological Society at its next Annual Meeting on January 11, 1916, will be asked to take further action upon the proposed bill.



GOLIATH HERONS

## ITEMS OF INTEREST

*Derelict Cats.*—Few city dwellers realize the evils resulting from the neglect of cats that are for a time kept as pets, then allowed to wander. This is well illustrated from our experience with stray cats within the boundaries of the Zoological Park. It has been necessary to detail one of our men to trap neglected felines that have taken to a life in the woods and subsist largely upon birds, young rabbits and squirrels. It is astounding to note the actual number of cats trapped within the area of the Park in the past three years. Up to the end of November, 1915, we had trapped and otherwise destroyed six hundred and two cats that were living and hunting in the Park. The Botanical Garden reports similar conditions.

When we consider the other large areas of the northern city parks where hordes of cats prowl unmolested, the extent of the depredations

of these bird-killing creatures may be estimated. Many of the captured cats are gaunt, savage creatures that through a marauding, half-starved and desperate condition are a real menace to full-grown rabbits and squirrels; and bird-hunting is their constant delight. Occasionally, also, one of these cats will fight a human enemy. The writer can attest this by an experience when a tramp cat emerging from some foliage deliberately leaped upward and savagely bit his hand: Keeper Romanoff, who so persistently hunts these animals, has several times been attacked by them.

During our cat-hunting work we have come upon a surprising number of other predatory animals in the Park. Our lists for three years show twenty-five wild racoons, twenty-one opossums and about a dozen weasels. Although in a different class, from the damage they do, we have also checked off fourteen muskrats.

R. L. D.

*Goliath Herons.*—When the writer visited the Zoological Gardens of Amsterdam, in 1912, no bird exhibited there was so attractive as the Goliath Herons (*Ardea goliath*). Their great size and striking appearance rendered them highly impressive. There were seven in the Gardens—two adults, a pair one year old, and three young birds of the season. Later on the three young birds were secured for the Zoological Park, where they soon attained the full plumage of maturity. We believe these are the first living specimens to reach this country.

The old birds have been in Amsterdam for many years, and their numerous offspring have stocked half the collections of Europe. They nest in a tiny indoor compartment, not more than six feet square, which communicates with an outdoor run not much larger. They are persistent breeders. Although autumn was well advanced at the time of the visit, the female was engaged in incubation. While there was little chance at that time of the young being successfully reared, there was nothing to gain by removing the eggs, as it was certain that the bird would lay again, at once.

The Goliath is much the largest of the herons, topping our own great blue by several inches. Its general color is slaty above, with rufous head, neck and underparts. It is not gregarious, but generally is found in pairs, or in small family groups. Although it is distributed throughout the greater part of Africa, it is nowhere abundant.

L. S. C.



YAK CALF

*A Musk-Ox Bull Becomes Savage.*—For five years our large bull musk-ox remained passive and docile, but his demeanor has suddenly changed. Without warning the animal suddenly turned upon his keepers, and ever since that time he has made persistent attacks upon the corral fence, the doors of the shelter building and the walls of his stall. Fence posts were loosened, doors completely shattered and so much damage was done that the animal was shut in while his environment was materially strengthened with angle iron, steel tubing and heavy girders. The histories of the few captive musk-ox that have attained adult age have quite paralleled our experience with this one. The bull that was kept at Woburn Park, England, in 1903, was very savage and aggressive.

*Wild Deer in New York.*—Each year we receive many telephone calls informing us that deer have been observed in the open sections north and east of the Zoological Park. Observers generally believe these deer have escaped from the Park ranges. There appears to be a fair number of wild white-tailed deer in lower Westchester County, and these wander southward along the stretch of woods bordering Central and Jerome Avenues, and the Hudson River. One of these deer recently investigated the city proper, passed through the populous Tremont section, thence down the Grand Concourse, and into the cellar area of an apartment on College Avenue, where he was corralled by the police. Our keepers were sent to capture and crate the animal, but the deer had been injured in an endeavor to leap over an iron fence, and

it died within a few hours. The animal was a two-year old female of the white-tailed deer species. Several other wild deer have been caught inside the city limits, and turned over to us.

*Ape Finger-prints.*—In filling the request of a scientific correspondent, we recently made finger prints, with lamp-black solution, of our young orang-utan "Datu." The work so interested the keepers that prints were made of "Datu's" entire hand, and of the hands of several of the monkeys, also. It was surprising to compare the similarity of those impressions with those of human hands. The "whorl," and various other specific lines that interest the palmist, were present in striking variety. Possibly, here is a field for study which has been neglected!

*The Play of an Elephant.*—Khartoum, our male African elephant from the Sudan, continues to grow and to cut up capers at the same time. Recently, the keepers provided him with a large section of a tree-trunk, as a plaything. This particularly heavy object was selected because in former times the playthings given to the elephant often were hurled at visitors, of course, in a playful spirit. For an hour or more Khartoum rolled the log around the stall, and evinced every indication of being much amused. Then, when Keeper Thuman for a moment went into the feed room, the elephant stood the stump on end in the middle of the stall floor, carefully



AN ACROBATIC BUCK



DATU IN WINTER DRESS

climbed upon it like a performing animal and a moment later there was a great crash of glass. The elephant had succeeded in reaching the ventilator chain, and his experimental tug at this was so vigorous that it shattered the pane.

*A Growing Tortoise.*—At the San Diego exposition, very recently, a long-haired dispenser of natural history misinformation frequently assured the frequenters of the Isthmus that turtles live to the age of 2,000 years, and he cited a "stuffed and mounted" harp turtle to prove it.

Despite many allegations that the growth of the gigantic tortoises from the Galapagos Islands is exceedingly slow, and that these animals live for hundreds of years,—if they have good luck,—we have had quite contrary experiences with them at the Park. A specimen received here ten years ago has increased from a weight of one hundred and forty to over three hundred pounds. Moreover, conditions here, in the varying temperature of New York, would be not nearly so conducive to rapid growth as the uniformly hot climate of the animal's native home. The Galapagos Islands are nearly under the Equator.

*Landsberg's Kinkajou.*—There is a very tame kinkajou in the Small Mammal House that follows Keeper Landsberg literally about "like a dog." The kinkajou occupies rather a doubtful place in classification, being of alleged relationship to the raccoons. In form it is somewhat like an otter, but with large and intelligent eyes, and a long prehensile tail. In its habits it is chiefly arboreal. If its favorite keeper is passing through the building, the kinkajou invariably jumps upon the hand-rail to run after him, and if a visitor is unwarily looking into a cage the animal hurdles over his hands, usually to the consternation of the unsuspecting.

R. L. D.

*Crested Eagle.*—The crested eagles of the genus *Spizaetus* are among the finest of the Accipitrine birds. Most of the species are handsomely colored, with occipital crests more or less strongly developed. They are uniformly active and aggressive. Sixteen forms are recognized, of which five have been exhibited in the Zoological Park.

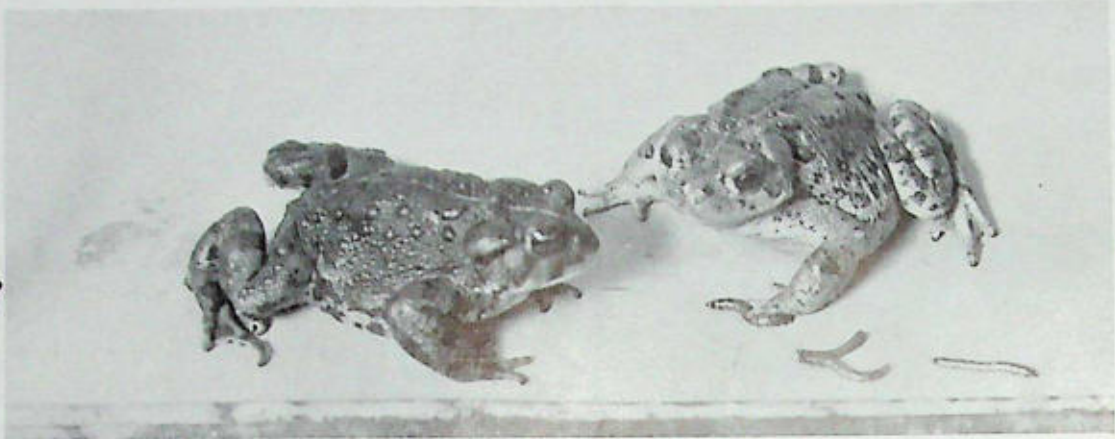
The Crowned Eagle (*S. coronatus*), a native of the great forests of South Africa, is one of the most striking. In size it is somewhat smaller than our bald eagle, but stronger and more fierce than the larger bird. It is gray above, and buffy below, strongly marked with black blotches, which increase as the birds grow old. The crest is well marked.

Two specimens are now in the Society's collection. One was secured from the Zoological Gardens of Antwerp in 1912, and the other was purchased from Lt.-Col. Boyd Horsbrugh, two years later. The two birds amicably shared a cage for some time. One afternoon, however, they were found tightly locked in fierce combat, and since that encounter they have been confined in separate quarters.

L. S. C.



CRESTED EAGLE



CALIFORNIA TOADS

The toads are set preparatory to catching the meal-worms.

### TAME CALIFORNIA TOADS.

By RICHARD DECKERT.

**F**ROGS and toads are known by everyone who has observed them in their natural environment to be shy, secretive and easily frightened. They will, as a rule, bow their heads, at the same time squatting low and drawing the limbs close to their body in an effort at concealment, as if aware of the protection afforded them by the harmony of their neutral tints with their surroundings. Again do they seek protection in precipitate flight, diving into the nearest brook or pond, or hopping into the dark depths of surrounding vegetation.

These traits are the more understood when one considers that these practically defenseless animals are the favorite prey of snakes, owls, hawks, skunks, cats, weasels, crows, chickens, storks, herons and many other rapacious hunters. Even bears do not disdain the dainty morsel that a fat frog presents, and last, but not least, comes the omnipresent small boy with air rifle, slung-shot and "bean shooter."

Among the numerous frogs and toads on exhibition in the Reptile House there are a number that have quite overcome their natural timidity. The lack of hiding places, combined with the protection afforded them by the glass walls of their vivariums, appears to have accustomed them to the constant movement of visitors near their cages.

Boldest of all are the California toads, (*Bufo halophilus*), from the Pacific Coast. This is the largest North American species of toad, often exceeding five inches in length of head

and body combined. It has a satiny skin covered with numerous round, smooth warts; large, intelligent eyes and short, muscular arms and legs. Owing to the shortness of its limbs, this toad prefers walking or running to hopping in regular toad fashion.

When the cover is removed from their vivarium, these toads look up, even stretching upward in expectation of food. When the feeding is done from the front, after the glass has been raised, they will invariably come forward, taking the food from one's hand, and often seizing a finger or the edge of the hand in their eagerness to dine. Of course no harm is done, as toads have no teeth, and the pressure of the toothless jaws, although firm enough to hold struggling insects, can not injure the human hand. When one of these queer animals seizes a large earth-worm, the antics gone through in the effort to master the long, strong and slippery prey, appear quite ludicrous.

The worm is often seized somewhere near the middle, when it begins to squirm and twist in an effort to free itself. With its "hands" the toad tries to convey the protruding parts of the worm into its mouth. Sometimes as fast as an inch of worm is shoved into the capacious mouth on one side, equally fast does it squirm and slip out of the other. Finally, becoming tired of this seemingly useless procedure, the toad resolves to put all his energy into one supreme effort. He then puts both "hands" up to his mouth, "fingers" outspread and palms turned outward, lowers his head and butts the worm against the ground, until finally he succeeds, with much winking and blinking of eyes, in subduing his refractory prey.



FREIGHT TRAIN WRECKED BY AN ELEPHANT

Even after the worm has been swallowed, the toad will keep up his antics, arching his back, puffing out and drawing in his sides, and blinking his wonderful golden eyes, while the worm is still trying to escape from its predicament. Spiders, flies, mealworms, grasshoppers and other insects are picked up with the lightning-like tongue, and the capacity of the California toad for this "small fry" is almost limitless. The writer has fed as many as one hundred and twenty meal-worms to a single toad, one by one, and when he tired of counting, the toad continued looking for more. This particular specimen will eat insects out of one hand while being held by the other. When carried about, sitting quietly on the palm of one's hand, it will turn its head when a new direction is taken, and if the hand is slowly slanted, the toad will cling with all his might, instead of hopping off.

Another specimen was taken to the writer's home one evening, and placed upon the table, where dinner was in progress. It was summer, and the light over the table had attracted some insects, which flew in despite the screens. Some of these alighted on the table, whereupon the family toad proceeded calmly to snap them up, walking around between dishes and paying no attention to anyone. The children of the family immediately proclaimed the toad a satisfactory pet and were loath to part with that specimen.

#### ELEPHANT VS. LOCOMOTIVE.

IT is not often that a wild animal deliberately locks horns with an active locomotive on its own rails. Jumbo was killed by a locomotive, but the encounter was not of his seeking. It was an accident.

Once, however, a vicious bull elephant elected to try conclusions with a whole railway train. In one respect the bad elephant took second money, but the punishment inflicted upon the locomotive and several cars was so great as almost to justify calling the contest a draw.

It was in 1906, on the Korat branch of the Siamese State Railway, that a bull elephant disputed the right of way with a freight train running at full speed. He charged the charging locomotive, and the result to the train is shown in the accompanying reproduction of a photograph kindly furnished by Dr. E. B. McDaniel, for twelve years the head of the Mission Hospital at Petchaburi, Siam.

The elephant was killed outright, and buried under the wreckage of the train. The locomotive was derailed and sent down the side of the grade; several cars were derailed and piled up, and, worst of all, two persons were killed.

Judging from the complete openness of the country; there was no excuse for an elephant on the track, and therefore the charge of the Siamese "Gunda" was wholly gratuitous.

*Snakes and the Mexican War.*—Troubles along the Mexican boundary have resulted in



DROMEDARY AND GUDHA OR DWARF DONKEY

a peculiar snake condition. We find it difficult to obtain large specimens of the western diamond-back rattlesnake, owing to the fear of collectors to venture within that bullet-infested region. A collector in Texas who zig-zags back and forth across the boundary line wrote us recently as follows: "I can't catch any big rattlesnakes now. On my last trip the only thing I got was a collection of bullet holes through my new Ford car. They said they didn't shoot at me, but this didn't make me feel any better." The collector mentioned brings in as many as *two hundred rattlers* in a week's trip! He does not bother to pick up specimens under four and a half feet in length; and many of them are over six feet long and twelve inches in circumference. These big rattlers seem imbued with the fighting spirit of the region. When first placed on exhibition they rattle continuously for hours. The Texas collectors sell their rattlesnakes in novel fashion, charging not according to the length of the individual. After selecting specimens of the required size they weigh them, and sell them at thirty cents per pound!

#### ITALY STOPS BIRD SLAUGHTER.

UNDER date of December 8, from Rome, the Trustees of the Permanent Wild Life Protection Fund are informed by Frederic C. Walcott that "the Italian Government has at last passed a law, which goes into effect January 1, prohibiting the shooting of all song and insectivorous birds throughout Italy." If this prohibition also includes, as it is only fair to assume that it does, the netting of all such birds, then Italy has indeed carried into effect a great reform. The importance of this action to the birds and the crops of Europe is beyond computation. Hitherto the netting of song birds while on their migrations has been a wide-spread industry, and the deadly roccollo has each year slaughtered hundreds of thousands of the choicest song-birds of Europe for food. Both in America and in England this abuse has been severely denounced, and an American bird protector has declared that it was "a reproach to the throne of Italy."

The causes which brought about this reform in Italy, in spite of the excitement of war, are as yet unknown.

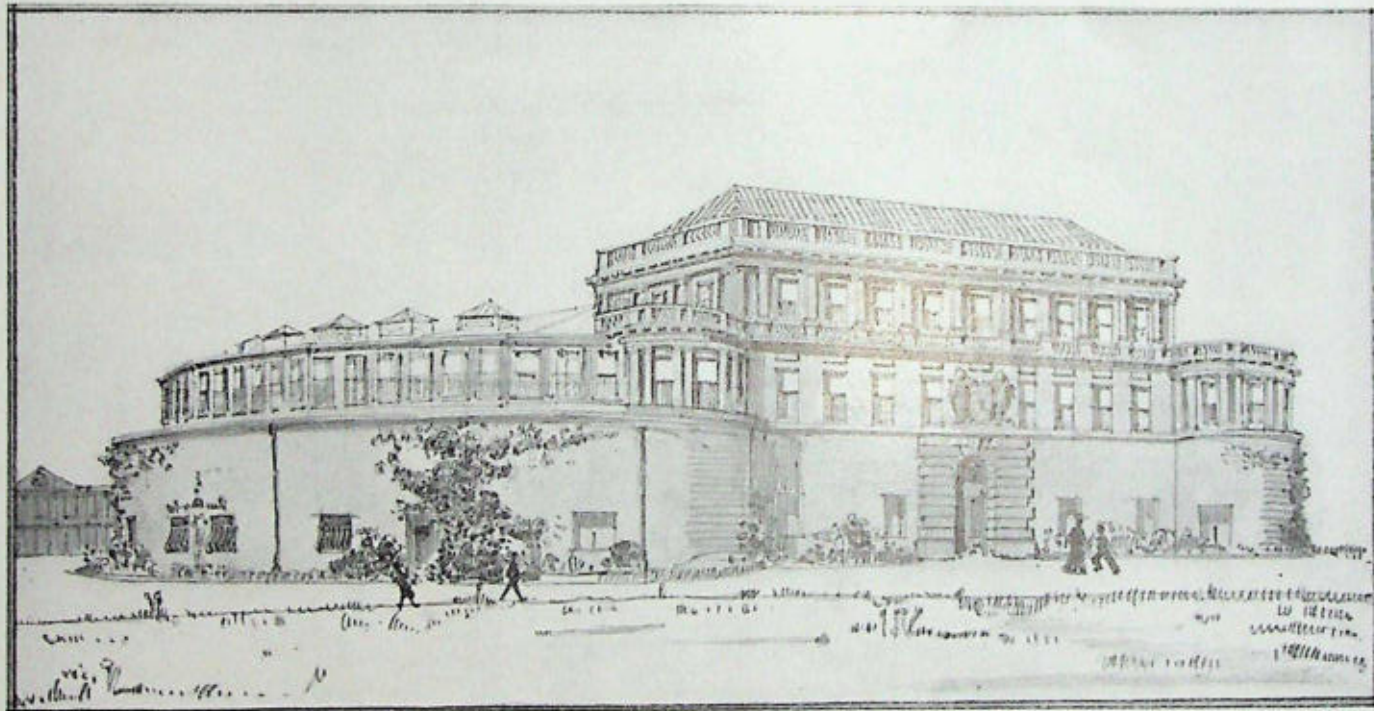
W. T. H.

# ZOOLOGICAL SOCIETY BULLETIN

## AQUARIUM NUMBER

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SKETCH OF THE NEW YORK AQUARIUM  
Showing proposed third story for laboratory purposes

# ZOOLOGICAL SOCIETY BULLETIN

*Published by the New York Zoological Society*

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VOL. XIX.

MARCH, 1916

NUMBER 2

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## SHALL THE AQUARIUM HAVE A BIOLOGICAL LABORATORY?

*By C. H. TOWNSEND.*

THE New York Aquarium is an institution which, by reason of the limitations of the present building, is denied the opportunity of a logical and necessary development. In spite of the many improvements in equipment which have been made during the past few years, the number of its exhibition tanks remains exactly the same. It is sheer lack of space which prevents development. Plans for a larger building were completed sometime ago, but there is no prospect, in the near future, that funds can be provided for its erection.

At this moment the vital needs of the Aquarium are, several more large exhibition tanks, an exhibition room to be devoted to a collection of small aquaria and a large laboratory. The small aquaria are needed for the care of delicate forms of aquatic life which it is impossible to exhibit in the large tanks in the main hall. The greatest need is biological laboratories.

The necessity of the case suggests possible expedients by which the three essential improvements might be accomplished. Space for large exhibition tanks could be gained by the removal of the ponderous boilers and pumping machinery outside of the walls, thus vacating space equal to one-fourth of that now occupied by exhibits.

We are assured that it will be impossible to secure funds for an outside pumping plant.

Space for the laboratories and a hall for the small aquaria may be secured by a moderate outlay, in the construction of a third story across the front of the building. The accompanying illustration suggests the improved exterior effect which the building of this third story would produce.

The importance of having biological laboratories at the Aquarium is a matter for serious consideration. Their provision would give the long desired opportunity for scientific work. The Aquarium has frequent requests from investigators for assistance in the matters of laboratory space and material. It is even now sharing its limited office space with a special investigator of the United States Bureau of Fisheries.

The Aquarium should be so equipped that it could take care of investigators in a manner that would be creditable to such an institution. Most of the biological laboratories of the country are open only in summer. A laboratory at the Aquarium would be of service throughout the entire year and the solution of problems requiring long experiment would be greatly facilitated. The biological stations of Europe and America are laying the foundations for the scientific cultivation of fishes and other aquatic animals useful to civilization. They occupy a field similar to that of the agricultural stations. Practical fish and oyster culture have already benefited from the investigations conducted in biological stations by the conservation and increase of the resources of our fresh and salt waters.

Important pathological studies have long been carried on based entirely on material supplied from the Aquarium.

There is nearly always at the Aquarium a large amount of material, from both fresh and salt water, available for biological investigation, and the Aquarium's collector could easily secure much more material for special studies than is now brought in. This material is not being utilized scientifically for lack of facilities for

studying it. Considerable quantities of small seashore invertebrates are annually given to school teachers for class work.

The Director of the Aquarium is frequently asked by educational institutions and state fishery boards to recommend a young man with laboratory training, who is capable of investigating problems connected with fisheries. Within the past month he has found such a worker for the New York Conservation Commission.

The Aquarium requires a well equipped biological laboratory to carry on the daily study of aquatic life of which so little is known. The embryology, physiology, adaptations and heredity of these forms offer interesting fields of investigation which it is the duty of the Aquarium to pursue.

The problems of heredity appeal to popular interest and the living collections give daily demonstrations of their inherited tendencies.

In all parts of the world where tides ebb and flow there are hosts of marine animals that inhabit the space that is daily covered or laid bare by tidal action. Most of these creatures have in the course of ages become dependent upon the conditions created by tides. When the tide is out many of them burrow into the sand or mud. They can feed only when it is in. It has been found that some animals accustomed to burrow into the sand at low tide will do so even in an aquarium constantly full of water. The movement of the tides affect them unflinchingly, and they begin to burrow twice each day when the tide begins to ebb.

The effects produced by daylight and darkness are very marked in some marine animals. The phosphorescent creatures of the sea are luminous only at night. Even when kept in a totally dark laboratory room they shine only when it is actually night time.

Certain sea animals with the power of changing their colors, take on in the daytime the colors of the sea-weeds among which they live, while at night they regularly assume paler colors. These changes they will make even if their surroundings in the laboratory are actually reversed.

Even sea pressure leaves its mark on marine animals. It is the nature of the eel when it reaches maturity to leave the fresh waters and descend into deep water in the sea, where it spawns.

If forced to remain in the Aquarium tank during this period, gas bubbles form under the skin, because of the lack of sea pressure which is necessary at that period.

Heredity compels an animal to continue the inherited habits connected with its life processes, and so the revolution of the earth on its axis, the influence of the moon and sun upon the tides, and even the revolution of the earth around the sun, produce effects on some of the simplest of living things.

We are indebted to the biological laboratories of the world for many of the most interesting discoveries in modern zoology. If the Aquarium, with its varied living exhibits of marine animals, had a well-equipped laboratory, it could at once take a place among the institutions devoted to biological investigation.

#### THE GUADALUPE FUR SEAL. A CONTRIBUTION TO ITS HISTORY.

By C. H. TOWNSEND.

THERE is but little recorded concerning the natural history of the Guadalupe Fur Seal, and the only known specimens are in the United States National Museum. These were obtained by the writer at Guadalupe Island off Lower California in 1892, and were soon after described as a new species (*Arctophalus townsendi*) by Merriam.

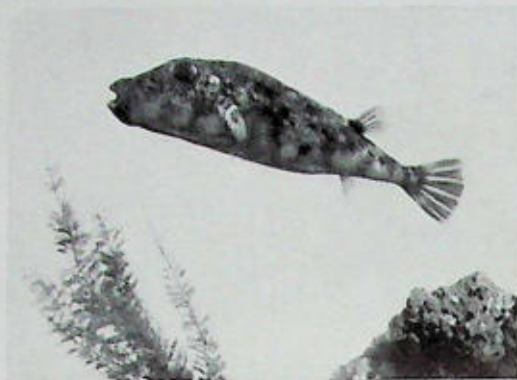
After visiting Guadalupe, the writer succeeded in locating in California some of the seal hunters who had formerly engaged in sealing at Guadalupe and the adjacent San Benita Islands, and from whom he obtained considerable information. In some cases old log-books showing the numbers of seals killed were available. The information secured from these original sources and published in 1899 represents all that is known of the species.

The records, which are no doubt very incomplete, show that at least 5,575 fur seals were killed at Guadalupe and the San Benitas between 1876 and 1894.

After the lapse of more than twenty years, during which time nothing further respecting this seal has been brought to light, it is interesting to be able to add something of importance to the record.

Quite recently, while reading William Mariner's account of the Tonga Islands, published in 1827, I learned that fur seals were being killed at the San Benita Islands in 1806.

The *Port au Prince*, whaler and privateer, Mr. Mariner being on board, sailed from Gravesend, England, February 12, 1805. On the first of August, 1806, she reached Cerros



PUFFER IN NORMAL CONDITION

Island off Lower California, it having been determined between the captain and the whaling master "that the *Port au Prince* should proceed for the island of Ceros, to make up for her ill-success in her whaling cruise, by laying in a cargo of elephant oil and seal skins."

"She left Ceros on the 23d of August, and on the 25th came to an anchor at the Benito Islands, where she remained till the 11th of September, having salted and laid in 8,338 seal skins. On the 19th of September, having touched at the island of Guadalupe, she stood out to sea, taking a fresh departure from this place for the island of Owhyee [Hawaiian Islands]."

In November, according to the narrative, the *Port au Prince* reached the Tonga Islands, where she was seized by the natives, who burned her and murdered half of the crew, Mr. Mariner being among those spared.

The cargo of seal skins was no doubt lost with the vessel, as mention is made in the narrative of the loss of the whale oil that was on board. Doubtless there was oil of the elephant seal of Lower California in the cargo, the species being formerly abundant at Ceros, where the vessel remained nearly a month.

The Guadalupe fur seal, so far as known, has not been seen since 1894, and even now may be nearer to extinction than the elephant seal of the same region. In March, 1911, the writer made a search for it at Guadalupe, but without success.

It is altogether probable that many whaling vessels of the earlier period of the century visited the islands off Lower California in search of fur seal skins, and that other published or log-book records on the former abundance and habits of this seal will eventually come to the notice of naturalists.

The record of 8,338 fur seals taken in 1806, found in Mariner's Tonga, is most interesting in this connection.

## THE PUFFER.

### ITS DEFENSE BY INFLATION.

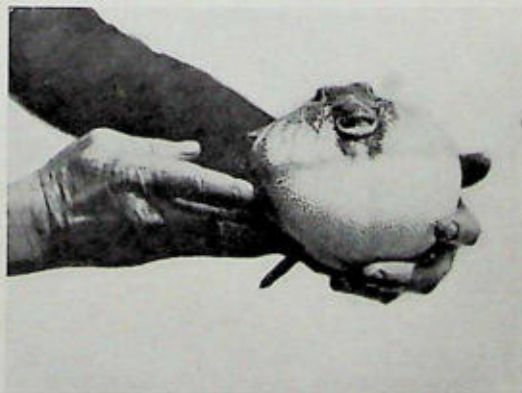
By C. H. TOWNSEND.

**P**UFFER fishes inhabit all tropical and warm seas. There are many species; some of them reaching a length of about two feet. They have attracted attention from the earliest times on account of their habit of inflating themselves with air or water until they become almost spherical in shape.

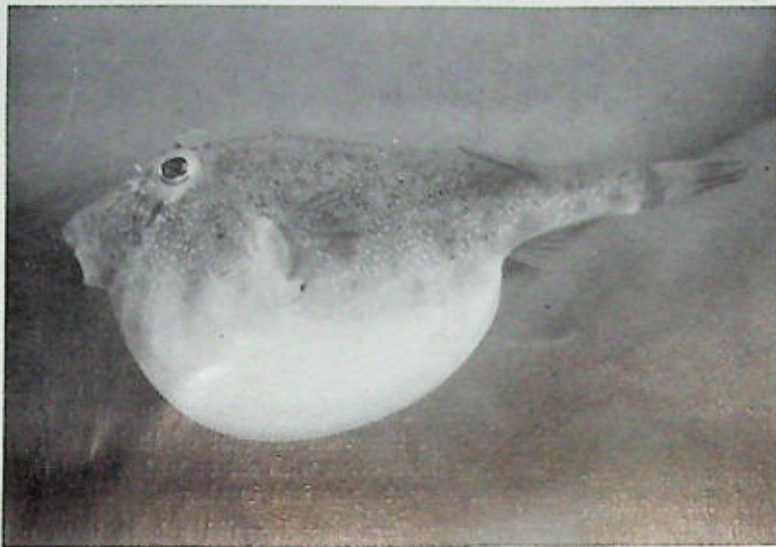
When puffers are dragged ashore in a net they will quickly take in air until the skin is stretched to its fullest extent, and remain inflated until thrown into the water. Even when thrown back they may float for a time upside down, with the abdomen, or in some species, with oesophagus still tightly distended. If left on the beach they can be knocked about without a particle of air escaping and may die in that condition.

The habit of inflation is protective, and the fishes will distend themselves with water as tightly as with air, if they are attacked under water.

A few good-sized scup or porgy were placed in an aquarium tank containing a dozen young puffers about two inches in length. The hungry scup attacked them at once. In an instant all the puffers were fully inflated with water and became almost globular in form, so that the scup were unable to do more than knock



PUFFER INFLATED



PUFFER DISTENDED WITH WATER

them about like toy balloons, too big to be swallowed, and on which they could get no hold whatever.

When young puffers are fully inflated with air, they are almost incapable of movement, and appear like small globes with the temporarily useless fins protruding at different angles.

The air or water tightly filling the abdomen or the oesophageal sac is kept there by a valve in the throat and can be discharged instantly.

Some of the puffers, such as the spiny species so common along our coast, are thickly covered with stout spines which become rigidly erected when the fish is inflated. This species is often called sea porcupine. The spines are modified scales and in some species are quite long and sharp.

Puffers which have been frightened near the surface and are inflated with air are easily driven by the wind and often drift ashore to be thrown on the beach by the waves and even rolled along the sands by the wind.

When taken from the water, puffers begin to inflate at once, making distinct sucking sounds until the utmost distention is attained. Inflated puffers placed in preserving fluid sometimes die fully inflated. They often die inflated on the sea shore and are dried by the sun and wind. It is a common practice with the Japanese to make lanterns of inflated and dried puffers by cutting out the back as shown in the accompanying photograph of a puffer "lantern" in the New York Aquarium. A candle

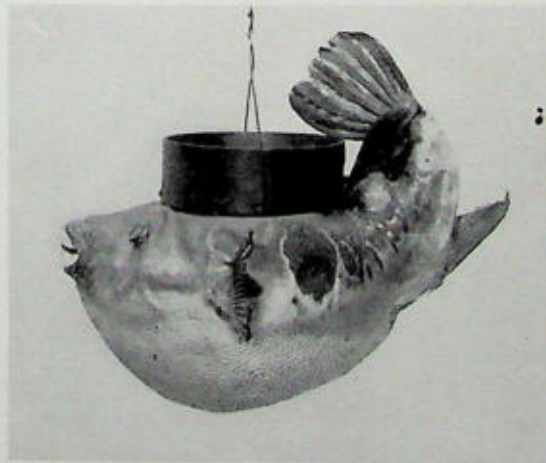
suspended by a wire serves as a light which shows as brightly through the stretched skin of the fish as through a piece of oiled paper.

In the tanks of the Aquarium the puffers are rather sluggish fishes, moving chiefly by their fins rather than by any forceful action of their chunky bodies.

There are three species which are common in our New York waters; the spiny puffer (*Chilomycterus schoepfi*) referred to above, the common puffer or swell fish (*Spheroides maculatus*), and the smooth puffer (*Lagocephalus laevigatus*). The last reaches a length of twenty inches, while the

others are seldom more than eight or ten inches long. They feed on young oysters, scallops, mussels, razor clams, limpets and other mollusks, as well as small crabs, shrimps, barnacles, sea urchins, ascidians, worms and sea weeds. All puffers have hard, parrot-like beaks, well adapted for crushing crabs and mollusks. The flesh of some tropical puffers is poisonous at times, probably acquired from their molluscous food. A Japanese species is said to be so poisonous that its gall was formerly used to poison arrows.

Not the least interesting thing about puffers is the fact that some species live only in large



LANTERN MADE FROM A LARGE PUFFER

TANK OF MUDDFISH (*AMIA CALVA*) NEW YORK AQUARIUM

rivers, like *Tetrodon psittacus* of Brazil, *Tetrodon pahaki* of the Nile and rivers of West Africa, and *Tetrodon fluviatilis* of the rivers of India.

#### THE MUDDFISH (*AMIA CALVA*) IN THE MARKETS.

THIS fish which is perpetually interesting to naturalists but always despised by fishermen, has at last some prospect of acquiring economic standing. It appears that it is being shipped from the west to Philadelphia markets in important quantities. A part of the supply is received alive, being shipped in cars with live carp.

The shipment of live carp is already an established industry, and cars especially constructed for the purpose are carrying live fishes chiefly from the Illinois River and from Lake Erie to the principal markets in Philadelphia and New York.

Mudfish are also shipped in ice like other fish, the quantity sold in Philadelphia varying from 1,000 to 2,000 pounds a week, and worth three or four cents a pound.

The live mudfish amounting to about 500 pounds a week are purchased almost entirely by Hebrews, and are worth from twelve to fifteen cents a pound.

If a permanent market can be found for it, fishermen can easily supply large quantities, as it is abundant in the Great Lakes region and the Mississippi Valley.

The mudfish, sometimes called bowfin and dogfish, is voracious and very destructive to other fishes. Anything contributing to lessen its numbers in those regions would also serve to increase the numbers of other and better native fishes.

The mudfish has been seen in eastern markets before, as fishermen of the Illinois River have sent it to market with other fishes. It sometimes weighs as much as twelve pounds and is hardy and long-lived. The Aquarium has specimens of the mudfish which have lived in the building fourteen years.—C. H. T.



MUD PUPPY (*NECTURUS MACULOSUS*) NEW YORK AQUARIUM

## THE MUD PUPPY OR WATER DOG.

**T**HIS large American salamander (*Necturus maculosus*) is nearly always to be found on exhibition at the Aquarium, and an excellent photograph of it is presented in this BULLETIN.

It is an inhabitant of the Great Lakes region and the Mississippi Valley. An allied species is found in North and South Carolina. Its conspicuous external gills enable anyone to distinguish it from another large salamander of the upper Mississippi region, the hellbender (*Cryptobranchus allegheniensis*) which it resembles in size and general appearance.

The food of the mud puppy, which is entirely aquatic in its habits, consists of the smaller water animals, crayfishes, small fishes, mollusks and insects.

In some parts of its habitat it is very abundant, as in Michigan and Illinois, where hundreds have been hooked or seined in a single day. It is an abomination to anglers, who sacrifice their hooks rather than handle the slimy creature in detaching them. The mud puppy lays its eggs in May and June under the shelter of a stone to which each egg is attached by a gelatinous stalk.

It reaches a length of eighteen inches or more. The largest specimen in the Aquarium is about twelve inches long.—C. H. T.

#### LONGLEY'S AND REIGHARD'S STUDIES OF THE REEF FISHES OF THE TORTUGAS, FLORIDA.

By ALFRED G. MAYER.

**T**HE colors of tropical fishes inhabiting coral reefs are brilliant and varied.

It has remained for Professor Longley to show that protective and not warning color is dominant among such fishes.

The fishes of the mackerel tribe, blue above with silvery yellow-spangled sides and glistening white belly fade into the background of the universal blue if one sees them as other fishes see by going down equipped with a diving helmet.

Such a helmet has been invented by Mr. Dunn of Miami, Florida, and it literally enables one in a moment to become for all intents and purposes a fish among the fishes of the reefs.

It was only after years of patient study that Professor Longley discovered the clue to this paradox of the brilliant color of these tropical fishes, yet if one considers their habits and



THE DUNN DIVING-HOOD IN USE

Photographed by Submarine Photo Co., Miami, Fla.

takes them in their normal surroundings they are found to be protectively colored, and hidden by many interesting devices from the eyes of their enemies. Often the fishes are observed to change from green to gray as they glide from the grassy bottom on to the sandy floor, and curiously at sunset many of the blue, yellow and green fishes bury themselves under the sand, so that the commonest day-time reef fishes are not to be seen at night.

At Tortugas one of our rarest fishes was the *Apogon*—"the marine goldfish," bright red with a black spot upon his side, and a huge eye, and only once or twice in a whole season did we find one. Now, however, due to Professor Longley's discovery, we know that they are the commonest fishes of the reefs *after* sunset, for when the blues, yellows and greens have gone to bed beneath the sand the marine goldfishes come out from many a hiding place. In fact Longley finds that red fishes with large eyes are nocturnal, and this is interesting for the "Michel Sars" deep-sea expedition proved that red rays were the soonest to be absorbed as light passed through the water. Thus in the

## ZOOLOGICAL SOCIETY BULLETIN

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Published bi-monthly at the Office of the Society,

11 Wall Street, New York City.

Yearly by Mail, \$1.00.

MAILED FREE TO MEMBERS.

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ELWIN R. SANBORN,

Editor and Official Photographer

VOL. XIX, No. 2

MARCH, 1916

dim, tropical star-light these fishes are well hidden, as but little red can penetrate beneath the sea they appear black and are lost in the surrounding gloom.

It was Professor Reighard, years ago at Tortugas, who showed that none of these fishes seem to be warningly colored, for no matter how gaudy their hues they are at once devoured by their larger fellows, if they can be caught; but the tortuous crevices and the strings of coral beach afford protection to many a languid swimmer with huge and ravenous enemies around him.

Reighard made some curious experiments. He accustomed the grey snapper which lived beneath the Tortugas wharf to expect a daily breakfast of a bucket full of silvery sardines or *Atherina*. Then one day he threw in a bucket-full in which half of the sardines were dyed a brilliant carmine red while the others were of their normal, silver hue. The silvery ones were eaten first and only slowly and later were the red ones devoured; but after three or four days both red and silvery ones were recognized as equally good and were devoured with equal avidity.

Then he dyed some of the sardines blue and although at first these strange looking fishes were avoided yet soon they, too, were recognized as being quite as palatable as silvery or red sardines.

Then the most interesting test of his experiment was tried. Some stinging tentacles of a jelly fish were cleverly hidden in the mouths of the blue fish, and silvery, red and blue ones were thrown to the hungry gray snappers.

After about seven of the blue ones had been tested, however, not one of the eighty or more gray snappers could be induced to seize an-

other, and even after three weeks they declined to touch blue ones even though these later "baits" had no tentacles in their mouths.

Thus apparently warning coloration seems not to exist in nature among these fishes, yet it may be established artificially with ease, and perhaps more wonderful we see that something like associative memory can be retained for at least three weeks by the Florida gray snapper, a fish, by the way, whose reputation among anglers, is that of being the cleverest among all the denizens of the reefs.

## FOOD VALUE OF THE SEA MUSSEL.

## DEVELOPMENT OF THE SEA MUSSEL INDUSTRY IN THE UNITED STATES.

The long neglected culture of the sea mussel on the coasts of the United States is a matter of sincere regret to men who have learned in Europe to appreciate this delicate and substantial sea food. Our foreign born citizens from French and Italian shores have introduced it in the markets of New York and San Francisco, but its use by our native sea board population has not yet begun. The American bon vivant finds the mussel served by foreign chefs a delectable morsel. But on the private table of the American it is unknown.

Filippini, in "The International Cook Book" gives three recipes; but there are other and simpler methods of cooking mussels of which probably steaming and serving in the shells is most familiar.

Professor Irving A. Field, of Clark College, has made enthusiastic and conscientious efforts to interest Americans in the development of a great natural resource. He has presented two papers before the American Fisheries Society that are worthy of wide circulation. In the one, published in 1910, he deals with the food properties and commercial value of sea mussels. He contrasts the large and ready market in Europe with the nearly unknown and very restricted use in the United States, principally in New York City. In his second paper, "Transactions of the American Fisheries Society, 1913," he gave an interesting historical sketch of sea mussel culture which dates from the early 13th century at Aiguillon on the western coast of France. It was accidentally discovered that young sea mussels attached themselves to stakes driven into the salt marshes for other purposes. It was observed that these mussels grow rapidly and were of superior quality to those which

grew on the mud. The alert mind which discovered this fact quickly came to the conclusion that mussels could be profitably raised on wooden frames.

Professor Field gives at length the methods of sea mussel culture in France, Italy, Great Britain, Belgium, Scandinavia and at Kiel.

The so-called British method of culture is to thin out natural beds, on good hard bottoms with only a thin layer of mud, and where silt is not too rapidly deposited, and transplant young mussels on artificial beds in favorable localities. The advantages of the bed system are recognized in other countries; it is recommended in Belgium, Sweden and Norway. Some of the progressive fishermen in this country have recently put the transplanting system into practice with great success in certain regions of Long Island Sound. In Germany the bay of Kiel contains extensive areas where mussels are cultivated. Stakes are driven into the bottom and left from three to five years during which time they become covered with mussels of marketable size. They are then taken up, stripped and replaced by others.

The raft is another means used to collect spat and when filled is towed to a breeding basin where it requires but little care. The objections to this method is the rapid decay of the planks of the raft. In Italy, from the southern shore north to Rome, the market is supplied from the vicinity of Tarante, where the mussels are cultivated on ropes made from rushes suspended in the water from stakes.

In Europe mussel culture ranks only second in importance to that of the oyster among the shell fish industries and its total value aggregates millions of dollars. In the United States where sea mussels are exceedingly abundant, but the food value of which remains unknown, the sale of sea mussels including those used for food, bait and fertilizer, barely approaches eleven thousand, six hundred dollars annually.

Professor Field gives us tables of the comparative composition and food value of certain shell fish and of the comparative cost of protein and energy furnished by sea mussel and other shell fish. The mussel, compared with the oyster, has four times the protein, three times as much fat, and thirty-one times as much carbohydrate, with a total nutrient value four times greater. Its calories, or fuel value, being one hundred and fifty against forty-one in the oyster. The comparative cost of the protein and energy furnished by sea mussels and that supplied by oysters is found to be twenty-two and a half cents per pound in the sea mussel and three

dollars and five cents per pound in the oyster. These tables prove that sea mussels, from the standpoint of economy, surpass all other shell fish food by a wide margin.

A French writer expresses the food qualities of the sea mussel by the following ratio: "Mussels are to oysters as potatoes are to truffles." In other words mussels are a substantial economical food not a luxury.

Prejudice is a barrier difficult to overcome, but the outlook is favorable for a gradual development of a sea mussel industry which will not stop until it has reached the same plane that it now occupies in Europe, second only to that of the oyster.

E. B. TOWNSEND.

#### UTILIZATION OF THE TILEFISH.

The campaign inaugurated by the United States Bureau of Fisheries in October and November for the introduction of the tilefish into the markets has yielded most satisfactory results. The fishing vessel chartered by the Bureau made four trips to the tilefish banks, 100 miles S. E. of New York, and landed nearly 40,000 pounds.

Other vessels at once engaged in the fishery, and there is now a large and regular supply of this excellent fish in the markets of New York, Boston, Philadelphia and other cities.

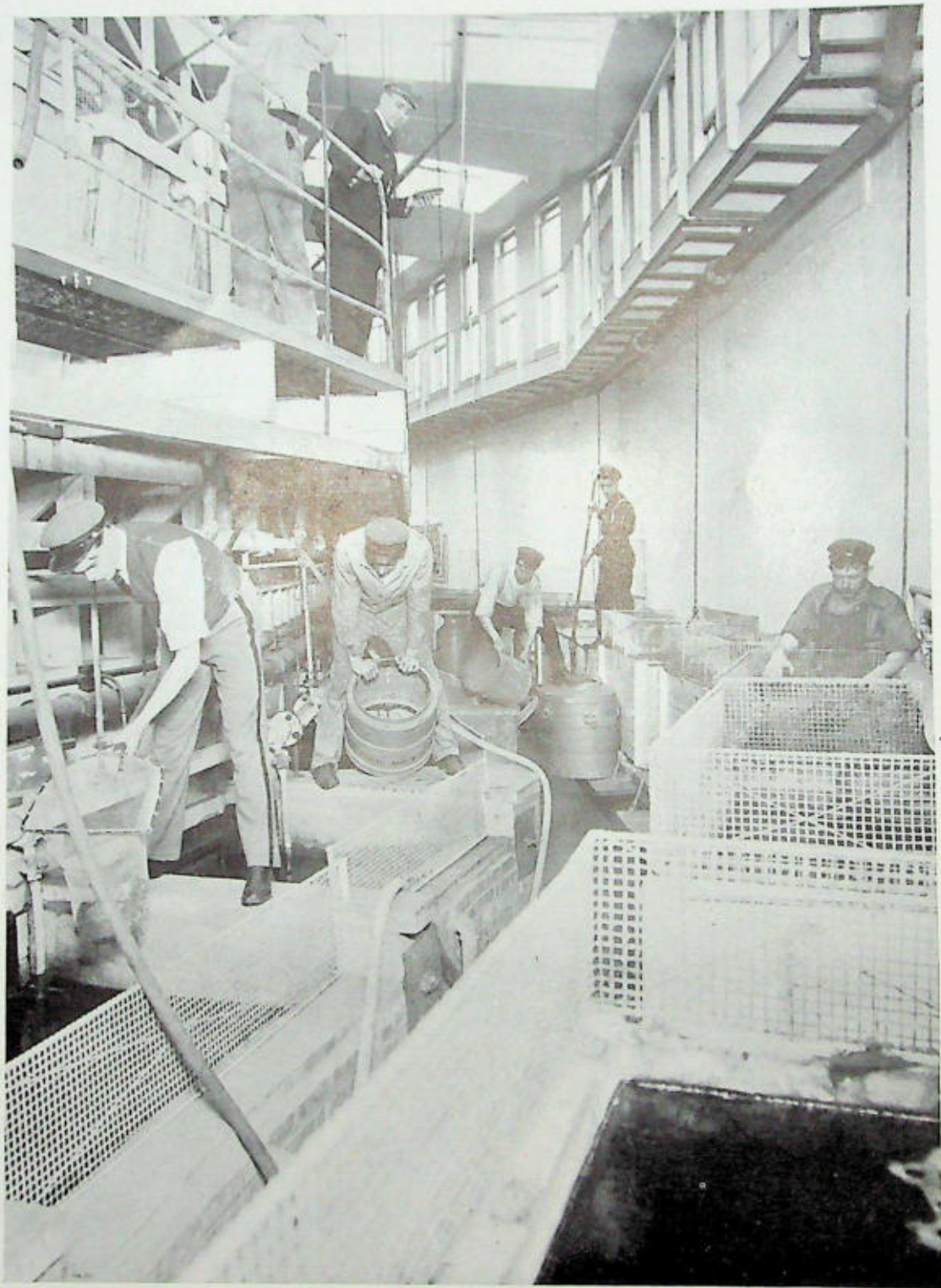
The supply of tilefish on the fishing banks seems to be large and the catch can be sold at moderate prices. There are now six vessels fishing from the port of New York and the quantity of tilefish landed during the month of January was nearly 400,000 pounds.

The United States Bureau of Fisheries has detailed the steamer *Roosevelt* for an investigation of tilefish grounds off the capes of the Chesapeake, as there is reason to believe that the fishing grounds for the tilefish may extend somewhat farther south than has hitherto been supposed.—C. H. T.

#### THE PACIFIC SALMONS.

##### AN INTERESTING STUDY ON THEIR PHYSIOLOGY.

One of the most interesting papers which the reviewer has had the opportunity to read for some time is one entitled "On some quantitative physiological changes in the Pacific salmon during the run to the spawning grounds," written



BEHIND THE SCENES AT THE AQUARIUM

by Prof. Chas. W. Greene of the University of Missouri and published in "Transactions of the American Fisheries Society for December, 1915."

It treats of changes in the Pacific salmon of the genus *Oncorhynchus* on the long run to the spawning grounds while at the same time their reproductive organs are undergoing development. Moreover, while the paper does not even hint at this phase of the topic, it gives one a good picture of the exhausted condition of the salmon at the end of the run and explains why they are unable to survive.

As has been abundantly proved, these salmon take no food after entering the brackish water at the mouths of the rivers. For the long run of hundreds to even a thousand miles or more, often against raging torrents, the fish must thus draw upon its stored supplies of energy. At the beginning of the run the reproductive organs are immature and the development of the abundant supplies of eggs and milt also must depend on the release of food material from other tissues.

The problem is well stated by Professor Greene: "The two principal facts, namely (1) the expenditure of the large amount of energy without external food, and (2) the development of one set of organs at the expense of material derived from other organs, form a unique biological experiment in nutrition. The experiment is unusually favorable also because of the fact that it is carried out in nature under conditions that must be assumed to be normal and natural for the animal."

The king or chinook salmon (*Oncorhynchus tshawitsha*) from the Sacramento Basin of California was the particular form chosen for study. Comparisons were made of the condition of fishes of the same length obtained in the sea before the beginning of the run, from the head of brackish water, and later, from the spawning grounds of the United States Fish Hatchery at Baird, California.

The work deals especially with the muscle, which is the great storehouse of nutritive material, both for the fish and for man. The weight of the total mass of muscle substance was computed both in the wet and dry conditions for fishes from all three localities.

One very interesting fact is that the fish in working their way from the sea to the head of brackish water actually gain 11% in weight without taking any food. This is explained by the absorption of water. A gain in weight of 5.6% is shown by the wet muscle, but the study of the dry muscle shows that there is actually a loss of 0.8% in the nutritive matter.

The most important difference, however, is found on comparing fish from the spawning grounds with those from either of the other localities, and the astonishing loss of nearly three-fourths of the dry muscle substance is observed. The figures given for the three localities, in percentage of dry muscle, are as follows: sea salmon, 25.9%; head of brackish water, 25.9%; spawning grounds, 6.8%. Moreover the fat, which is the important nutritive substance, forms from 15% to 20% in the down river individuals, while at the spawning grounds it has practically disappeared, only 1% to 2% remaining. The material left in the muscle is therefore only the proteid, which represents only about one-third of the nutritive value of the same amount of fat.

Professor Greene sums up the results of his work in the following statement: "The food material of the salmon stored in its muscles when it begins its run to the spawning grounds is represented by 25.8% of the total weight of the fish, whereas at the end of the spawning run it is represented by one-third of 6.8%, or 2.3% of the total weight of the fish, a loss of between 84% and 85% of the stored material.

Similarly the other tissues of the body give up their material. The visceral mass, for example, is reduced to only one-eighth of its original weight. It thus appears that all the available material is devoted to the production of the sex cells and to the energy required for the long run to the spawning grounds, and thus the fish is actually used up to such an extent in this great culminating effort of reproduction that even the continuance of life is impossible.

R. C. OSBURN.

#### SOME HABITS OF THE FOUR-EYE FISH (*CHAETODON CAPISTRATUS*).

By L. L. MOWBRAY.

WHILE one is observing fishes among the coral reefs, it is not an unusual thing to see the busy little chaetodons or "four-eye" fishes, as they are commonly called.

The species that is known as the four-eye is so called because of the eye-like spot on either side just below the soft dorsal rays.

The general color is silvery and lemon yellow. There are numerous lines of brown running along the rows of scales, and a band of jet beginning at the top of the head and running forward and downward, almost completely hiding the eye from view, then downward and

FOUR-EYE FISHES (*CHAETODON CAPISTRATUS*)

Photographed at the New York Aquarium

backward to the gill flap. The spot below the dorsal rays stands out clearly, and one not knowing the fish would naturally mistake the tail for the head.

The four-eye is one of the most interesting and curious of coral fishes, and is seen usually in pairs picking at the corals and sea weeds on which it finds the greater part of its food, comprising small crustacea and annelids. Swimming in and out of the crevices and holes, it will chase an intruder from its feeding ground. Although it cannot harm a larger fish, it will attack one many times its size, bristling up its fins, swimming around and darting at and butting the offender until it leaves.

A habit of this genus which I have frequently observed is that they will live in and feed around the same hole in a reef for many years. The chaetodons are fearless little fishes and will be found among many other forms, and seem to be respected by them. In fact, the four-eyes are useful to the others in removing parasites from their mouths and sides. I have many times observed them picking at large groupers

and morays. While in Bermuda I observed at the Aquarium, the four-eye swimming into the mouths of the green moray (*Lycodontis funebris*) and the black grouper (*Mycteroperca bonaci*). When first noticed, I thought this habit was caused by the lack of small crustaceans in the tanks, and that necessity had driven them to take desperate chances. But why did the larger fish insist, when the little fellow seemed to have satisfied its own appetite? The larger fish maneuvering so as to get in front of and facing the four-eye, would stop and open its mouth. I carried the observation further, removing two of the four-eyes from the tank and placing them in one that contained a number of grunts (*Heamulon sciurus*), which species recognized them at once. The surroundings were strange to the four-eyes, and the pair moved about slowly for a few minutes. The grunts opened their mouths in front of the four-eyes, but the little fellows paid no attention to them whatever. The next morning I was at the tank early and the four-eyes were still nosing around. A little before noon I returned, and both were busy getting their meal of parasites from the

mouths and sides of the grunts. They would look into the mouths of the larger fishes, pick once or twice, and then carefully scrutinizing the sides of the fish, would continue picking, going from fish to fish until their appetites seemed satisfied or there were no more parasites.

The green moray is particularly friendly toward the four-eyes and will become very active in their presence. Continuing the experiments, different fishes were placed with chaetodons which had just been caught, to make sure that mere association had nothing to do with their fearlessness. I never observed friendly relations between parrotfishes and the chaetodons. Among the reefs as well as in the Aquarium tanks the chaetodons always seemed uneasy in the presence of parrotfishes. Another fish toward which they show the greatest antagonism is the little bean gregory (*Eupomacentrus*), but this is not so difficult to understand as both feed on similar foods. Two other species of four-eyes, *Chaetodon ocellatus* and *Chaetodon striatus*, are quite frequently seen and obtained on the reefs, but they are by no means as common as *Chaetodon capistratus*.

I have never noticed any species but the latter removing and feeding on the parasites clinging to other fishes, excepting a much larger fish, the blue angelfish.

#### THE MATTAKESSETT ALEWIFE FISHERY.\*

By ROY STANLEY CORWIN,  
Children's Museum, Brooklyn Institute.

TO such an extent have the alewife fisheries of the Atlantic Coast become depleted or destroyed, that one would scarcely expect to find at the present time a fishing company doing a lucrative business in these fishes. Such

\*The alewife, sometimes called river herring or wall-eyed herring, is found all along our coast, arriving in New York waters with the shad. Formerly occurring in great numbers in the New England states, and of great commercial importance, it is now comparatively scarce.

The decline of the alewife fishery to not more than a quarter of its former importance is a matter of serious concern. The causes are over-fishing, dams and other obstructions to its passage into the streams where it spawns, and pollution of the waters. Mr. Corwin's contribution on the alewife is timely and interesting.—THE DIRECTOR OF THE AQUARIUM.



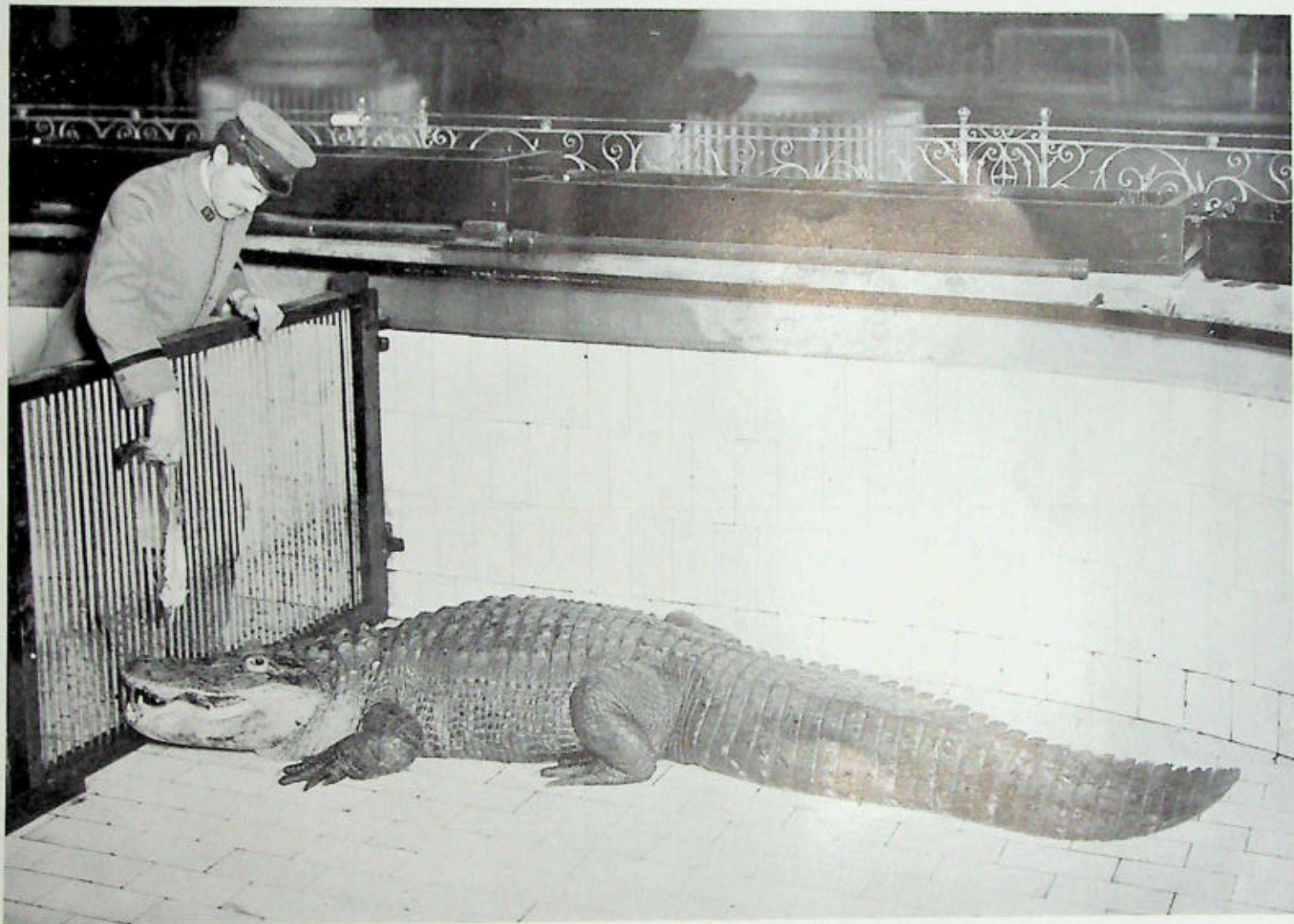
MATTAKESSETT CREEK  
An artificial waterway for alewives.

is the case, however, for at Edgartown, Martha's Vineyard, is located an aggregation of fishermen, incorporated under the name Proprietors of Mattakessett Creeks, who through systematic operation of an alewife fishery, derive from it several thousands of dollars annually.

It may be well to point out the alewife specifically. This fish belongs to the family Clupeidae or Herrings and to the genus *Pomolobus*. The alewife or branch herring is *Pomolobus pseudoharengus* (Wilson). The name refers to its deep, rounded belly. It is a deep-water species, inhabiting salt water all of its life, except when it ascends rivers to spawn in the fresh head-waters. The alewife spawns in the spring, generally late in March or early in April, and continuing through May. It is believed to mature in four years and to return for the purpose of spawning to the same stream in which it began its existence. Almost nothing is known of the habits or migrations of the alewife from the time it is spawned until as a mature fish about eleven inches long, it returns to perform the function of reproduction.

The Mattakessett Fishery is interesting in that the stream by which alewives ascend to fresh water is artificial instead of being a natural river or stream. Running parallel to the ocean shore and one-eighth of a mile from the beach, it connects a large body of fresh water, the Edgartown Great Pond, with Katama Bay; a sheltered portion of Edgartown Harbor. It is the third such stream created to make possible

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FLORIDA ALLIGATOR IN THE NEW YORK AQUARIUM



SEINING ALEWIVES AT MATTAKESSETT

an alewife fishery, the two previous ones having been filled in and obliterated by the landward movement of windblown sand.

The first Mattakessett Creek was dug by the Wampanoag Indians and used by them long before the coming of the whites to Martha's Vineyard, (then Capawoc). The second creek was excavated about 1783, by Indians and whites. So profitable was the alewife fishery on that stream, that it was said to be "better than a whaling ship." The present creek was dug in 1889 by the Proprietors of Mattakessett Creeks and required six months for completion; the excavating being done with horses and drag-shovels. It consists of a ditch about one mile long and thirty-six feet wide at the top. The stream is from twelve to fifteen feet wide and has an average depth of eighteen inches.

Alewives which are spawned in the Edgartown Great Pond in one year, will, according to the accepted belief, return the third year afterward in order to deposit their spawn in turn in its fresh waters. It will appear therefore, that the only requisite for the life and continuance of the fishery, aside from the supply of fresh water and food, is that a sufficiently large number of fishes be permitted to spawn in the pond every year. This precaution the operators of the fishery carefully take. On certain days the alewives are permitted to run, i.e., enter the pond without hindrance. Such fishes serve as brood stock. After they have spawned, they are allowed to leave the pond and return to salt water. And since indiscriminate fishing by heedless or unscrupulous persons is able to impair an alewife fishery, the "Proprietors" super-

intend the catching. This they are able to do because they have held under an Act of the Massachusetts State Legislature, passed in 1896, the sole right to seine in the Edgartown Great Pond.

To facilitate the catching, the operators have shut off by means of a seine the portion of the pond at the outlet, making of it a yard or pen about an acre in extent. The alewives are seined from this enclosure, the catch being hauled ashore. From the net the fishes are scooped and thrown into carts backed down to the water's edge. They are then drawn about four miles to the wharf where they are emptied immediately into barrels along with great quantities of salt to preserve them.

With the exception of a few hundred barrels of the earliest alewives which are sold as fresh bait to fishing vessels, it has been the custom of the "Proprietors" to dispose of their entire catch to a single large concern, generally the Gloucester Mackerel Company. The alewives are delivered at the wharf at Edgartown, where they are salted by employees of the Gloucester Mackerel Company, and subsequently placed aboard ships for transportation.

The total catch from the Mattakessett Fishery ranges from 2,500 to 4,000 barrels, and depends largely upon the quantity that the buying company will take. The size of the order depends again upon the condition of political affairs in the West Indies and Latin American countries which constitute the great market for salted alewives. Revolutions or other social disturbances in the places mentioned affect the market adversely.



SALTING ALEWIVES



YOUNG BLACK BASS WINTERING IN THE AQUARIUM

While the temperature of the water remains low they seldom take food

So fastidious has the fish-eating public of the United States become, that alewives or herrings, as they are most frequently designated, are spurned. The fact is that they are full of bones, and the story is told of a boarder being fed alewives by his landlady until he was unable to remove his shirt. But in the West Indies these fishes are treated with oil and certain condiments and served as a salad. The president of the Gloucester Mackerel Company testifies that this salad is delicious.

Although the alewife is not especially delect-

able to the majority of human beings, it is unquestionably of great importance as a food supply of other fishes relished by mankind. Such species as the bluefish and squeteague are known to be attracted shoreward by the presence of schools of alewives which are seeking the entrance to their spawning grounds. Doubtless fishermen, not connected with the Mattakessett Fishery, indirectly profit from it through the bluefish and weakfish which they catch while these larger, predaceous species are following the alewives.

## HIBERNATING FISHES.

WHEN winter weather comes and the temperature of the fresh water flowing through the tanks of the Aquarium falls below forty degrees, Fahr., some of the fresh water fishes become very sluggish.

The young yellow perch are likely to lie quietly on the bottom of their tank making but little movement and taking little food. They lie as evenly spaced as they could be arranged by their keepers.

Young black bass are affected by the low temperature in quite a different way. They remain poised somewhere above the bottom and crowded closely together. It is a common sight to see fifty or more of them compactly bunched and all facing one way. There are two tanks of young black bass in the Aquarium, both of which exhibit this habit to good advantage while cold weather lasts.—C. H. T.

## ITEMS OF INTEREST

## MEMORIAL TABLET TO PROFESSOR BAIRD

On February 9, 1916, a bas relief tablet was unveiled at Washington, D. C., bearing the following inscription:

SPENCER FULLERTON BAIRD  
1823-1887.

FOUNDER AND ORGANIZER OF THE  
UNITED STATES BUREAU OF FISHERIES  
COMMISSIONER OF FISHERIES 1871-1887  
HE DEVOTED HIS LIFE TO THE PUBLIC SERVICE  
AND THROUGH THE APPLICATION OF SCIENCE  
TO FISH CULTURE AND THE FISHERIES  
GAVE HIS COUNTRY WORLD-WIDE DISTINCTION  
HIS CO-WORKERS AND FOLLOWERS IN THIS  
FIELD DEDICATE THIS TABLET ON THE  
ANNIVERSARY OF THE ESTABLISHMENT  
OF THE FEDERAL FISHERY SERVICE  
FEBRUARY NINTH, 1916

The exercises were held in the auditorium of the National Museum. The tablet was presented by persons who served under Professor Baird or were associated with his work.

*A Fishery Conference.*\*—"On January 12, George D. Pratt, Conservation Commissioner of the State of New York; Ernest Napier, Fish and Game Commissioner of New Jersey;

J. M. Stratton, Chief Warden of the same Commission and Dr. Charles H. Townsend, of the New York Zoological Society met at the Bureau of Fisheries in Washington for a conference regarding the condition of the fisheries on the coasts of New York and New Jersey and the measures that should be taken to conserve the supply of important food fishes. A plan of investigation was decided on, and the Bureau of Fisheries promised to assist in the work."

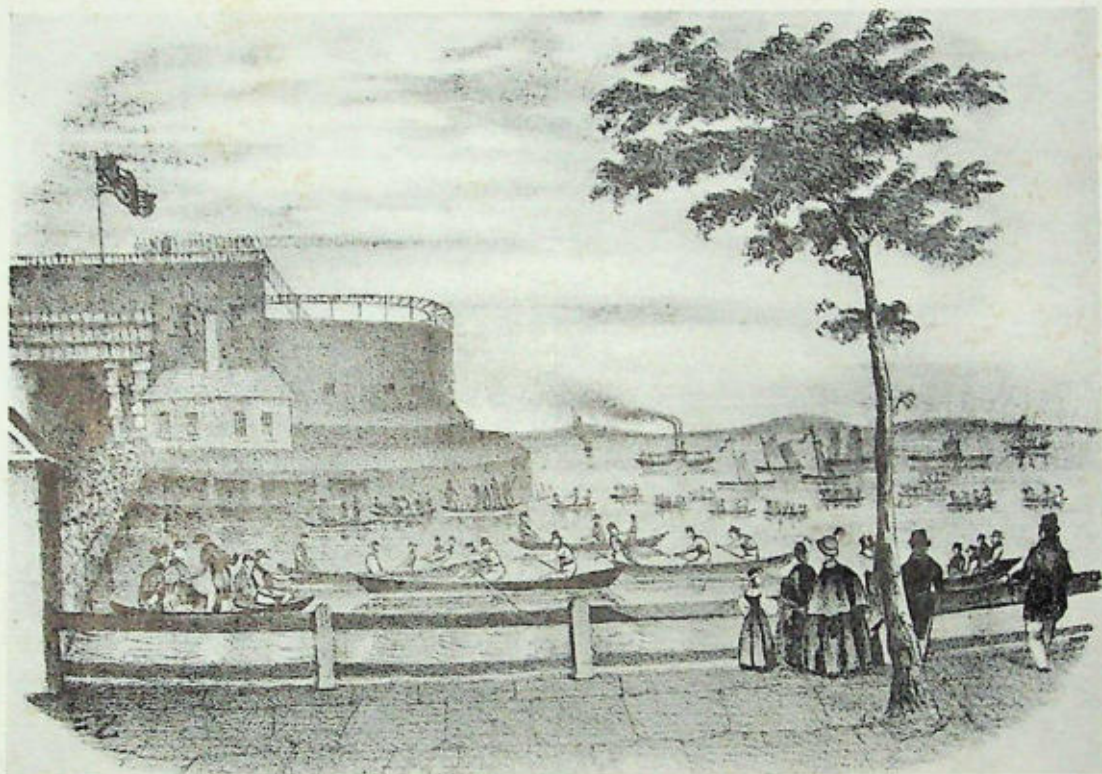
\*From the January Bulletin of the U. S. Bureau of Fisheries.

*Spotted Codling.*—The Aquarium received from Belford, N. J., in October, several specimens of a fish that is seldom represented there, the spotted codling or spotted hake (*Phycis regius*).

It is the most striking fish of its family, the heavily marked lateral line being broken by fourteen conspicuous white spots. In his "Fishes of New Jersey," Fowler records but a single specimen. In New York waters it is better known, specimens having been taken occasionally by the Aquarium collector at Gravesend Bay. It has been recorded from as far south as South Carolina, but is more common northward. The spotted codling ranges from the coast out to depths of 160 fathoms. The late Alexander Agassiz observed electrical powers in this species. It probably does not exceed one foot in length.

*Large Alligator.*—The alligator shown in this BULLETIN came to the Aquarium in 1903. It is nearly ten feet long. A large alligator in captivity lives an uneventful life, except for an occasional removal to another pool which removal may be eventful not only to the alligator but to those who undertake to do the moving. When the swinging tail of a big alligator hits something it hits hard, and the animal's vigorous protests with tail and jaws, accompanied with loud bellowing, command respect.

*Sanitary Conditions in the Aquarium.*\*—"It seems desirable to refer to this matter, as there is an impression in some quarters that the Aquarium is not as well ventilated as it might be. This is in part due to the fact that the Aquarium formerly had no mechanical system of ventilation. The installation of the Sturtevant system some years ago had the result of



THE AQUARIUM BUILDING, FORMERLY CALLED CASTLE GARDEN, IN 1836

From an old print

remedying this defect to a considerable extent. In warm weather when the building is crowded with visitors, the air often becomes close.

"Much of the labor of the Aquarium is directed to the work of cleaning. The tiled floors are carefully swept each evening and are washed with the hose every morning before visitors arrive. A vacuum cleaner is kept in regular use. The service galleries behind the exhibition tanks are kept well whitewashed, and washing and painting in various parts of the building is going on almost continuously. There can be little dirt in the Aquarium except that which comes in various ways with the daily crowd of visitors."

\*From the annual report of the Director of the Aquarium to the Board of Managers.

*Fishes and Their Parasites.*—Most of the fishes which are lost from time to time at the Aquarium are the victims of worm parasites which are found in their gills, intestines or viscera. Dr. G. A. MacCallum, who for some time has been making examinations of all such

specimens, has described a number of new species of parasites infesting our fishes.

There may be nothing in the appearance of a fish or of a whole tank of fishes, to show that they are not in the best of condition, but when a dead specimen is examined, it is usually found to have suffered in some way from parasites.

It may be possible that some method may be found of eliminating these pests. Fishes in the Aquarium have often been observed drawing sand into their mouths and blowing it out through the gill openings. It is possible that this is helpful when there are parasites attached to their gills. Acting on this hint, all tanks have recently been supplied with sand and many fishes are using it. •

There is no doubt that losses among our fishes have decreased as their needs have been discovered and the facilities for handling them improved. There are many specimens in the collection that have lived and thrived there for years, and the general health of animals in the Aquarium is excellent.—C. H. T.

To the Members of the  
New York Zoological Society:

The Executive Committee request the cooperation of the members in increasing the membership of the Society, by sending in at least two names of desirable candidates. Experience has shown that the best recruits are obtained through those interested in the Society, and it is hoped that each member will follow the suggestion contained herein.

Owing to the unsettled conditions of the past year, the losses by death and resignation have offset a gain of 141 new members, so that the membership remains practically unchanged. While the Society is in a good financial condition, an increase in the membership, as well as in the Endowment Fund is imperative before any extension in the activities of the Society can be made.

THE EXECUTIVE COMMITTEE OF THE  
NEW YORK ZOOLOGICAL SOCIETY

I suggest the following for membership in the New York Zoological Society:

NAME

ADDRESS

Please sign on this line if you desire your name used.

Note.—This slip can be mailed to the offices of the New York Zoological Society, 111 Broadway, New York City.

May 1, 1916



## ZOOLOGICAL SOCIETY BULLETIN

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JAPANESE SIKA DEER

# ZOOLOGICAL SOCIETY BULLETIN

*Published by the New York Zoological Society*

VOL. XIX

MAY, 1916

NUMBER 3

## DEER FOR PARKS AND PRESERVES

*By* RAYMOND L. DITMARS.

WE have many queries as to the best species of deer with which to stock parks and private preserves. One correspondent may wish to keep several species of native deer, and wishes to know which thrive best. Another may desire to breed either native or foreign deer for sale. There are numerous queries from owners of large estates who desire to breed deer for the pleasure of seeing the animals practically at liberty in their forests. Some of the latter prefer native deer, while others are partial to the more showy exotic species. It is to cover some of these queries that this article has been prepared.

Unfortunately many species of our native deer are not nearly so hardy when removed from their native haunts as are several of the foreign species. With the exception of the American elk or wapiti, all American species must be very carefully fed and tended for a number of months following their transplantation. Unless expert care is given them, there may be losses. Several species of the North American cervines are quite unable to endure captivity in the eastern states. These are the moose and caribou. The real reasons are by no means fully understood, but the difficulty does not lie altogether in their food. The same trouble is met, but to a less serious degree, in acclimatizing the western mule deer and the Columbian black-tailed deer.

We have long since ceased to make experiments with the moose and caribou, because the exhibition of these animals is nothing less than slow murder. With the white-tailed deer we have had little difficulty. After long and sys-

tematic study, we have been successful in maintaining specimens of the mule and black-tailed deer and have successfully bred both those species. Their longevity as captives on exhibition here is in the order named.

It should be understood that all our North American deer are browsing animals, and feed largely upon leaves and the ends of tender branches. This is a difficult food to match unless such animals are to be turned into a large forested estate. Here such species as the white-tail, mule and black-tailed deer will usually thrive with but little artificial food during the summer, although they require hay (clover) and oats (coarsely crushed) during the winter months. While it might seem theoretically possible to maintain the moose under such conditions, it is a question with this animal of supplying specific kinds of browse. With the caribou there is a necessity of certain rock mosses, which spoil by heating when packed and shipped.

Thus among our North American cervines we may figure four species available for amateur breeding: the elk, white-tailed deer, mule deer and black-tailed deer. Among these the males of the first named species are usually very dangerous and inclined to make unprovoked attacks during the breeding season. The acclimatization of elk is a simple matter, as these animals easily endure both heat and cold. They thrive upon a simple diet of clover hay and coarsely-crushed oats, and in summer may be turned into pasture if the grass is not too rank from undue moisture in the ground. They are less inclined to browse as food than the smaller deer, and

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NORTHERN WHITE-TAILED DEER



tense inflammation of the entire digestive system, and often incurable. Red clover hay and crushed oats, with cut vegetables added to the latter, are the proper foods. If these deer are corralled, during the summer they should be provided with cut browse, such as birch, willow, maple or poplar. This species readily breeds in captivity. In the mating season many of the adult bucks become highly dangerous, and the utmost care is necessary to avoid tragedies.

The care necessary to the mule deer, and the smaller Columbian black-tailed deer, is similar to that required by the white-tail, but with the western animals grass should be quite eliminated unless it is freshly cut, fed in very moderate quantities, and the results are carefully noted from day to day. These animals usually



even in large preserves require feeding the year round unless abundant pasture is available, when grain in summer may be practically eliminated. The species is a prolific breeder. Yearling elk may usually be purchased at seventy-five dollars each. Breeding females sell at one hundred dollars, while a fine buck with large antlers is usually valued at one hundred and fifty dollars.

Mature examples of the northern white-tailed deer may be purchased for from thirty-five to fifty dollars. In settling down, this deer often fails unless turned into woodlands where there is plenty of browse. It should be kept from pasturage unless the grass is very dry, because a grass diet is liable to produce a stubborn type of gastro-enteritis, and involving in-



FALLOW, WHITE-TAILED AND SIKA DEER FAWNS

Immediately after birth, deer fawns seek concealment. As will be seen in the upper picture, they are exceedingly adroit in hiding.

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AXIS DEER HERD

exhibit a run-down condition during mid-summer, when they become enervated from heat and fly-bites. Such a condition must be met with a slight increase in the grain food, with an abundance of succulent vegetables thoroughly cut up. However, it is highly important when increasing the food to watch carefully for intestinal disturbances, and when any are observed at once reduce the quantity of green food. Unless systematic study of the wants of these western animals is pursued, the writer would not recommend them as satisfactory for exhibition or experimental breeding in the eastern United States. In good health they breed as readily as the white-tailed deer, both species occasionally producing two fawns. The mule deer is a very beautiful animal with showy antlers, and it derives its name from its large ears. Adult males may be purchased at from fifty to one hundred dollars and females for seventy-five dollars. Prices of mature examples of both sexes of the true black-tailed deer are about twenty-five dollars less than for the former species. All the prices mentioned are those generally quoted in the east.

Of late there has been much interest in foreign deer, of which there are a number of attractive species, of large, moderate and small size. The commonest, least expensive and most hardy species are the red deer and fallow deer. Both are hardy, excellent for exhibition, and among deer fanciers are well known. These are the favorite park deer of all Europe, and the English red deer has been introduced in New Zealand with a degree of success that is nothing short of amazing.

The large and showy sambar deer, of which the more prominent species are the Indian and Malayan sambars, are well worthy of the attention of breeders, especially in the south. While these animals are able to endure the northern winter, if provided with large stalls opening into a barn moderately heated, they spend much of their time indoors during the cold months. In the southern states, however, these large deer could be handled under ideal conditions, and the Indian sambar has been successfully introduced on St. Vincent Island, near Apalachicola, Fla., by the late Dr. Ray V. Pierce. They are splendid breeding animals and as adults weigh from 500 to 600 pounds, the breeding of this species might well be considered for the purpose of producing venison.

These deer sell in New York at one hundred and fifty dollars each for the adult specimen.

Another fine foreign species is the barasingha deer, an Indian species of distinctly smaller size than the sambar, which acquires an attractive golden-brown pelage in summer.

Eld's deer, also called the Burmese thameng, is a smaller species, characterized by the horizontal brow tines of the antlers, which also give it the name brow-antlered deer. We have been uniformly successful in breeding all of them, and our chief embarrassment has been in the line of over-production.

Among the smaller exotic deer the less showy species are the sikas of eastern Asia and Japan, and the hog deer of India. Both these species thrive in captivity. The former requires no artificial heat during the winter. The hog deer needs access to a stall, with a small door permanently open, in the interior of a building moderately heated by a stove. Both the above species are inclined toward great timidity, and this is a drawback as compared with the more sanguine disposition of the fallow deer, a universal favorite that needs no artificial heat.

In reviewing the desirable types of deer it is appropriate to particularly point out the beautiful axis deer of India, which is permanently spotted with snow-white, like the most attractive fawns of certain other species. It is one of the finest of all cervines for American parks, either public or private, and there is no drawback to its maintenance that is at all serious. The axis is really the handsomest of all deer, being beautifully spotted all the year round; and it is physically so sound and strong that (here) *none ever dies of disease!* It is very prolific, and also pacific. Rarely does it happen that a male becomes so quarrelsome that he cannot be left in the herd; and there is less fighting between the members of this species than in any other species we know. Temperamentally, the only flaw in the axis deer is extreme nervousness about being caught and handled, and in making shipments from a herd this is sometimes a very troublesome handicap.

Our axis deer are always fat and in fine condition, and no one can resist their beauty. The only drawback in their maintenance, in comparison with the fallow, sika and our native deer, is the fact that in the three cold months of winter they need in the center of their barn a cheap, base-burner stove and about two tons

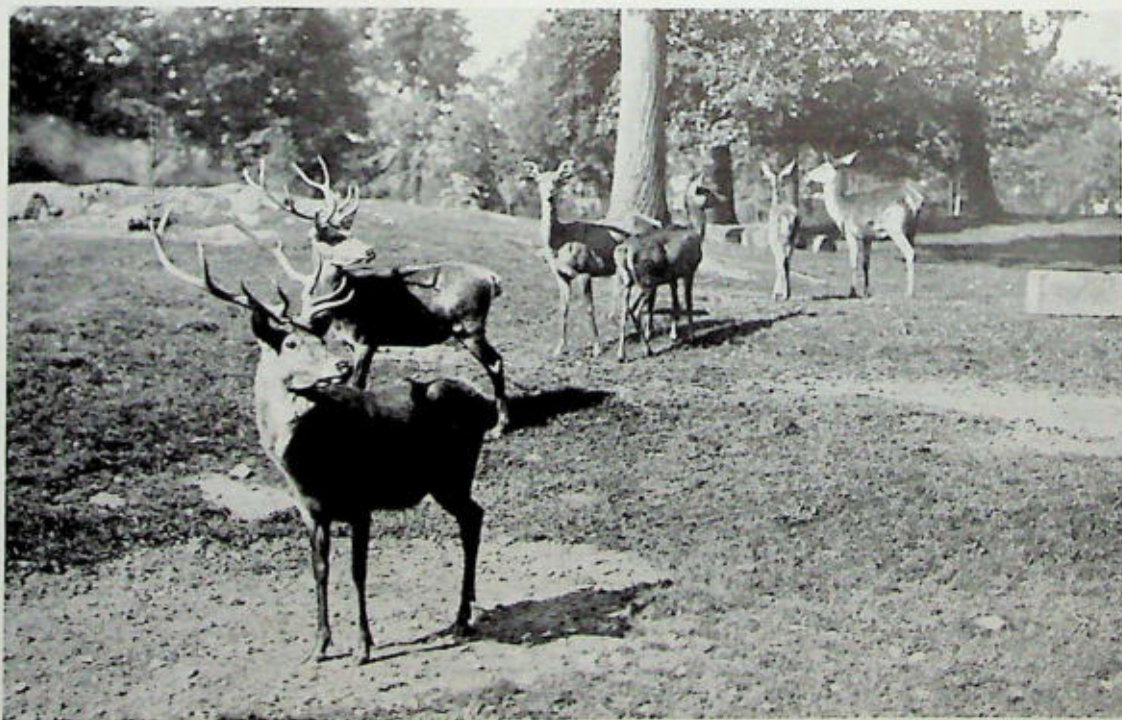


COLUMBIAN BLACK-TAILED DEER AND TWIN FAWNS

of coal, to keep their shelter dry and slightly warmed. They need to run in and out freely all winter, through a small and low door.

A small herd of axis deer is well worth all the trouble that it costs to keep it. Values range according to the ages of specimens. We have bred and sold many, and the demand is

uniformly steady. Yearling animals bring seventy-five dollars; two-year-old's, one hundred dollars, while more mature examples are worth up to one hundred and fifty dollars each. The accompanying illustration of these brilliantly marked animals will convey an idea of the attractiveness of the species.



RED DEER HERD

## NEW BIRDS OF PARADISE.

CONSIDERING the present scarcity of birds in the market, and the difficulties of transatlantic travel, it seems rather remarkable that among the few birds which have come to us direct from England since the beginning of the war, are three pairs of birds of paradise.

On July 1, 1915, Mr. G. Tyrwhitt-Drake arrived with a varied consignment of mammals and birds, which included two immature greater birds of paradise (*Paradisaea apoda*). With the possible exception of difference in size, there does not seem to be any suitable index for determining the sexes of young birds. As the first striking male characteristics to appear are the yellow head and green throat, which are acquired at the third annual molt, we can only wait until these develop before we shall know whether or not there are to be plumes. For the present, our young birds are healthy and active, and get on together fairly well, which is unusual for the larger birds of paradise.

Credit is due Mr. F. Weinberg for his skill in handling the two other pairs. After taking charge of them in London, he carried them through the perils of the war zone to Amsterdam, thence to Berlin, and finally back to Holland, where he took ship for New York. During all of his journey of about two months we were unable to get any word concerning the birds. We had begun to give up all hope of their arrival, so were doubly pleased when they finally appeared, on December 27, 1915, in the best possible condition.

Two species are represented: the red bird of paradise (*Uranornis rubra*), and the Wilson (*Schlegelia wilsoni*). Both are natives of the island of Waigiou, near New Guinea, and so far as we know neither has ever before reached this country alive. The red bird of paradise is slightly smaller than the greater, but is considerably more brilliant. Like the latter species, the male is chestnut brown in general, but the neck, chest, back and smaller wing coverts are golden yellow. The face and throat are metallic green, the feathers being raised in a curious little tuft over each eye. The two central tail feathers are modified into flat, horny structures, which reach a length of twenty inches or more. But the paramount beauty of the bird lies in the side plumes, which are deep red, with frosted tips. It seems that five years are required for the assumption of full plumage by the male. Our specimen now possesses the tail "wires,"

which appear the year before the plumes develop, and we hope that these wonderful structures will be acquired during the molt through which the bird is now passing.

The Wilson bird of paradise is a tiny species, not more than six inches in length. It is, however, exceedingly brilliant, and of a type entirely different from the preceding forms. Both sexes have the head bare and bright blue in color, curiously divided with narrow lines of black feathers. The tarsi also are blue and the lining of the rather wide mouth is greenish yellow.

In the male, there is on the nape, a shield of bright yellow, followed by red, the latter extending to the wing coverts and back. The feathers of the chest are produced to form a long semi-circular ruff, of iridescent green. When the bird is displaying, the yellow shield and green ruff are expanded and erected, so that they fall in the same perpendicular plane, producing, with the blue head, a striking color effect. Each middle tail feather, after crossing its fellow, describes an almost perfect circle, about one inch in diameter.

The female is mostly plain brownish, with a faint touch of crimson on the wings and upper tail coverts.

Wilson's bird of paradise is reputed to be very delicate in captivity, but as the species is new to aviculture, there remains much to be learned concerning it.

L. S. C.

## CALENDAR OF EVENTS.

*Board of Managers' Election.*—At a meeting of the Executive Committee on Thursday, April 13, 1916, Mr. E. C. Converse was elected a member of the Board of Managers of the Society, Class of 1918, to take the place of the late Samuel Thorne.

*Removal of General Offices.*—On May 1, 1916, the general offices of the Society were removed from 11 Wall Street to 111 Broadway. Telephone, 2710 Rector, as heretofore.

*Park Garden Party.*—It has been decided by the Executive Committee to postpone the date of the Annual Garden Party at the Park, from the second to the third Thursday, May 18, 1916, and to give the same under the auspices of the Board of Managers. Formal invitations will be mailed to the members of the Society about May 1.

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 ZOOLOGICAL SOCIETY BULLETIN
 

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## Departments:

<i>Mammals</i>	<i>Aquarium</i>
W. T. HORNADAY.	C. H. TOWNSEND.
<i>Birds</i>	<i>Reptiles</i>
C. WILLIAM BEEBE.	RAYMOND L. DITMARS.
LEE S. CRANDALL.	

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Published bi-monthly at the Office of the Society,  
111 Broadway, New York City.

Yearly by Mail, \$1.00.

MAILED FREE TO MEMBERS.

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

ELWIN R. SANBORN,

Editor and Official Photographer

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VOL. XIX, No. 3

MAY, 1916

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### SUICIDE OF OTA BENGA, THE AFRICAN PYGMY.

The members of the Society, and other readers of the BULLETIN, no doubt will recall the young African Pygmy, Ota Benga, who was brought from the St. Louis exposition with several others of his tribe to New York City by S. P. Verner in 1906. During his brief sojourn in this city he attracted much attention, not only from the visitors to the Zoological Park where he elected to stay, but also of many charitably-inclined persons, who conceived the idea that the Society had secured the boy as an exhibit.

As a matter of fact, Ota had a mind of his own, and a decided preference for life in the Park, where he was kindly treated. Upon his return to Africa, Mr. Verner urged Ota Benga to go back with his countrymen, but Ota refused to go.

Through the offices of a New Jersey colored Baptist association, his desire to be educated culminated in his admission to a southern school for negroes, but the gap between the heart of a savage African jungle and the civilized elysian fields of his desire, was too great to be bridged by Ota Benga. The following history, noted by the Lynchburg, (Va.) *News* constitutes the closing chapter of the life history of a savage who vainly tried to leap from savagery to civilization, over the intermediate stage of barbarism:

"The young negro was brought to Lynchburg about six years ago, by some kindly disposed person, and was placed in the Virginia Theological Seminary and College here, where for several years he labored to demonstrate to his benefactors that he did not possess the power of learning; and some two or three years ago

he quit the school and went to work as a laborer.

"After leaving the college he went into a colored home near the school, and since that had earned a livelihood by working in a tobacco factory, and by day labor. For a long time the young negro pined for his African relations, and grew morose when he realized that such a trip was out of question because of the lack of resources. Finally, the burden became so heavy that the young negro secured a revolver belonging to the woman with whom he lived, went to the cow stable and there sent a bullet through his heart, ending his life."

### UNCOMMON WINTER VISITORS.

In the autumn of 1915, the early arrival of large numbers of migratory birds from the north led us to assume the role of weather prophet, and to make a rather hazardous prediction of a severe winter to come. The heavy snow-fall during February and March, 1916, justified our faith in birds as foretellers of coming climatic conditions, and our hopes of seeing unusual species have been fulfilled.

Many birds have been attracted to the winter feeding stations which have been erected in the Zoological Park. Most of the usual winter visitors were represented—blue jays, nut-hatches, chickadees, juncos, and white-throat, song, chipping, field and tree sparrows. But on February 15 we were honored by a distinguished guest—a female evening grosbeak—which appeared at the feeding station just outside the writer's window. The bird stayed in the vicinity for several hours, feeding on cedar berries and the green tips of the twigs. She was quite fearless and easily approached, but finally wandered off, with the aimless, undulating flight of her species, no doubt to search for the flock from which she must have become separated.

The evening grosbeak breeds in western Canada, but in winter gathers in nomadic flocks, which wander about in search of food. It is not uncommon in winter in our northern central states, but up to 1889-90 had never been recorded in any New England state. At that time there was a very heavy migration of the birds into the eastern states, where they appeared in large numbers. With the coming of spring the flocks disappeared, and were recorded only occasionally until the winter of 1910-11, when a second wave flowed over the east. Gatherings of considerable size were observed at many points near New York, and bird observers were greatly interested in the phenomenon.

After the spring of 1911, the bird again became uncommon, a few stragglers only being recorded in the east each winter. During the past season, evening grosbeaks appeared at several points in New York state, three birds being seen on Staten Island. The one which visited the Zoological Park seems to be the only specimen which has been noted within the boundaries of New York City, exclusive of Staten Island.

L. S. C.

ANIMAL FUND SUBSCRIPTIONS.

During the month of April the Executive Committee have been endeavoring to raise a total of \$10,000, to be used in the purchase of animals for the Park. This sum is needed to maintain the high standard of the collections of the past. The Park needs the following:

- \$7,000 for giraffes,
- 4,000 for African antelopes,
- 3,000 for apes and monkeys,
- 2,000 for South American vertebrates,
- 1,500 for European bison,
- 3,000 for birds and reptiles from various sources,
- 3,000 for walrus, sheep and goats.

Subscriptions aggregating \$4,500 have been received from the members of the Board of Managers as follows:

Emerson McMillin ..\$1,000	Lispenard Stewart ... \$500
Ogden Mills .....	Henry M. Tilford ... 500
Grant B. Schley .....	George C. Clark .....
Watson B. Dickerman 500	Edward S. Harkness... 250

An appeal has been mailed to the members of the Society at large for the balance needed to complete the sum of \$10,000.

The results have been prompt and generous, but \$2,000 more are needed, however, to make the purchases necessary during the current year. Subscriptions can be mailed to the general offices of the Society, 111 Broadway. The following subscriptions have been received up to and including April 25, 1916:

James B. Ford .....	\$500	Frederick Sturges ...	\$50
J. P. Morgan .....	250	Mrs. Ezra Ripley .....	50
Jacob H. Schiff .....	250	Thayer .....	
Louis Boury .....	150	Mrs. Hugh D. Auchin-	
John D. Archbold .....	100	closs .....	25
Miss Eleanor deG.		Herbert S. Connell ..	25
Cuyler .....	100	Newbold Edgar .....	25
Mrs. H. P. Davison .....	100	James C. Farrell .....	25
James Douglas .....	100	Franz Fohr .....	25
Abram G. Nesbitt .....	100	G. H. Gould .....	25
Mrs. Wm. G. Nichols .....	100	Edward V. Z. Lane ..	25
L. S. Thompson .....	100	G. R. McLane .....	25
William Colgate .....	50	C. E. Milne .....	25
William G. DeWitt ..	50	Casimir de R. Moore	25
W. Dixon Ellis .....	50	Mrs. S. Neustadt .....	25
John T. Pratt .....	50	Dudley Olecott .....	25
Henry Heide, Jr. ....	50	Edward Robinson .....	25
Columbus O'D. Iselin	50	Mrs. H. S. Satterlee ..	25
Miss A. B. Jennings	50	Henry Schaefer .....	25
Mrs. August Lewis ..	50	Donald Scott .....	25
Edmund Penfold .....	50	Wm. Shillaber .....	25
Mrs. E. F. Shepard ..	50	Miss Jean W. Simpson	25
James H. Stebbins ..	50	Chas. Strauss .....	25

Mrs. J. T. Thompson.	\$25	Morris Kinney .....	\$10
Jonathan Thorne .....	25	Warren Kinney .....	10
A. Murray Young .....	25	Wm. N. Kremer .....	10
Mrs. W. Bayard Cut-		James B. Lowell .....	10
ting .....	20	F. Robert Mager .....	10
Karl Eiders .....	20	Joseph H. McGuire ..	10
Frederick Strauss ..	20	A. G. Mills .....	10
Franklin O. Brown ..	15	Edward L. Parker .....	10
Colgate Hoyt .....	15	Miss G. Parsons .....	10
A. F. Troescher .....	15	Robert L. Pierrepont	10
I. G. Webb .....	15	Abram S. Post .....	10
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Miss Edith Bryce .....	10	Pierre J. Smith .....	10
Miss Emily Buch .....	10	James Streat .....	10
John Everts Clancy ..	10	Joseph Stroock .....	10
E. H. Clark .....	10	L. S. Stroock .....	10
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Mrs. W. E. Damon .....	10	F. T. Van Bearen, Jr.	10
David Dows .....	10	Horace White .....	10
Mrs. Stuart Duncanson	10	Elmore A. Willets .....	10
John E. Dwight .....	10	Wm. Williams .....	10
Edwin J. Gillies .....	10	B. G. Work (Cash) ..	10
Mrs. Richard M. Hoe	10	Gerard H. Huntman ..	5
Richard M. Hoe .....	10	Mrs. J. J. Staples .....	5
Miss M. U. Hoffman	10	Henry W. Tait .....	5
Miss V. S. Hoyt .....	10		
Victor H. Jackson .....	10	Total .....	\$3,695
A. W. Jenkins .....	10	Board of Managers, 4,500	
Grenville Kane .....	10		
Frank W. Kitching ..	10	Grand Total .....	\$8,195

NEW MEMBERS.

JANUARY 1—MAY 1, 1916.

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C. Ledyard Blair.

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Withers, George B.

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Huntington, Dr. Geo. S., Schulte, Prof. H. von W.,  
Scott, Dr. Geo. G.

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Dohme, John Louis, Steers, J. Rich.,  
Haines, Henry F., Stevens, Oscar E.,  
Harris, Charles C., Stout, Andrew V.,  
Hollister, George C., Strauss, Albert,  
Hollister, Mrs. George C., Tabor, F. H.,  
Huff, E. S., Talmage, Mrs. Thos. H.,  
Lowther, Christopher M., Taylor, William R. K.,  
McCoy, J. C., Tenney, Daniel G.,  
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Parsons, Herbert, Tjader, Richard,  
Parsons, Mrs. John E., Turnbull, William,  
Peckham, Miss Marie L., Van Cortlandt, Augustus,  
Potter, Fuller, Van Slyck, George W.,  
Reid, Wallace, Vernon, Mrs. C. D.,  
Roberts, Miss G. van B., Villa, Alfonso, P.,  
Roe, Maj.-Gen. Chas. F., Walker, Jr., Joseph,  
Roof, Clarence M., Weeks, Dr. John E.,  
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Schall, Jr., W., White, Mrs. Stanford,  
Scharmann, A. C., Wiborg, F. B.,  
Schumacher, Mrs. S. H., Williston, James R.,  
Scott, Mrs. Frank H., Williams, C. S. (U. S. N.)  
Seligman, Joseph L., Wilson, Jas. Godfrey,  
Shattuck, A. R., Wilson, M. Orme,  
Sheehan, William F., Work, J. Henry,  
Shepard, Dr. George A., Wortley, R. M. Stuart,



TEXAS DIAMOND-BACK RATTLESNAKE.  
This is the snake that caused Keeper Toomey's trouble.

## TREATMENT OF OUR FIRST CASE OF SNAKE BITE

By RAYMOND L. DITMARS.

NATURE has provided the snake's hypodermic fangs and connecting poison glands for the purpose of killing; primarily for killing the prey; secondarily, to overpower an enemy. Through the ages of evolution, these terrible weapons of the poisonous snake have been perfected, and the lethal power of the poison intensified. For about twenty years the most practical treatment of snake-bite has been the injection of an anti-venomous serum. The history of artificial immunity began with the introduction of vaccination by Jenner. Pasteur afterwards introduced a method of protecting animals against certain infectious diseases by inoculating susceptible animals with cultures of bacteria or their products, which were weakened in virulence. Finally, it was discovered that the *blood serum* of animals so immunized could be utilized to cure disease in other animals. The curative anti-venomous serum is an antidote produced as a result of our knowledge

acquired through the laboratory study of the formation of certain substances (antibodies) in the blood, appearing only during infection. These substances have the power of forming antidotes to neutralize or annul the poisonous products. The reader must bear in mind that the application of the anti-venomous serum in snake-bite is employed as an antidote rather than a true antitoxin, as applied in the treatment of infectious diseases. If we inject into an animal gradually increasing doses of the toxins of a disease-producing micro-organism, not only does the animal acquire immunity against that poison, but its blood-serum will neutralize or render inert this poison if mixed with it; consequently if we inject some of this immune serum into an animal already suffering from that particular poison, it will enable it to recover. This body is called an antitoxin. Horses are generally used for the production of various antitoxins.

The horse to be immunized is given a very small preliminary injection of snake venom. Recovery is awaited, which is followed by an injection of slightly increased strength. This process goes on, extending into weeks and months. Finally, there is little effect from even a large dose of the injected toxin. The animal has been fortified against the attacks of the venom by the formation of an antitoxin. In a way, the latter term is a misnomer, though it signifies the condition. A wonderful change has taken place in the animal's organization. It may now withstand what would be fifty times over a fatal dose to an animal not treated; yet it shows no ill effect. What has taken place, we are unable definitely to say. What we know is that the animal's blood, when injected into another not immune, produces not only immunity against the development of attacks upon the heart and nerve centers, but causes great swellings to quickly subside. Blood is drawn from the horse without injuring the animal, and from this the serous, yellow portion is removed. We call this product "anti-venomous serum."

For twenty years the Pasteur Institute at Lille, France, has been producing an anti-venomous serum, for which the world is indebted to Dr. Albert Calmette. As the death rate from poisonous snakes always has been particularly high in India, averaging over twenty thousand the year, Calmette's serum has been made principally by immunization from venom of the cobra. While this serum has marked beneficial effect with the bites of all snakes, its action is particularly marked after bites involving venom of cobras or their allies. This results from the fact that different snakes secrete venoms showing chemical variance. While the basic elements of snake poisons are similar, the ratio of the elements widely vary. The cobras and their allies possess a high degree of nerve-attacking elements (neuro-toxins) while the thick-bodied poisonous snakes (rattlesnakes, lance-heads and Old World vipers) have a high ratio of blood-destroying elements (haemo-toxin). Even among members of the cobra family, the ratio of the nerve-attacking element with the blood-destroying force may vary. This is particularly the case among the vipers.

Owing to this variance in the nerve or blood-destroying action of snake venom, anti-venomous serums have been produced by immunization with mixed poisons, from both types of poisonous serpents. This was a step in the right direction an anti-venomous serum for each group of snakes having distinctly different poisons as regards ratios of toxic elements. To

produce these different anti-venomous serums, however, is a costly and elaborate process. South America, the home of a number of very deadly snakes of varying toxic ratios, is indebted to Dr. Vital Brazil for a unique and wonderful institution of very great value to human life. In an admirably equipped institution, the Instituto Serum-Therapico, at Sao Paulo, Brazil, he is engaged in the production of quantities of specific serums for the venomous snakes of the American tropics. Thus far he has made four types of anti-serums: for the rattlesnake (*Crotalus*); the lancehead snakes (*Lachesis*); the coral snakes (*Elaps*), and another produced by immunization of the three mixed poisons, for use in cases wherein the victim is unable to identify the type of reptile concerned. While Dr. Brazil explains that the last-named serum may save life, there is a great difference in its application from that of the agent secured by operations with poison of the same kind as that of the snake inflicting the injury.

This preliminary description of new discoveries with anti-venomous serums has immediate bearing upon the first case of snake-bite in the Park. By a remarkable and also fortunate coincidence, Dr. Brazil was in New York when the accident occurred, and for the first time in the United States a serum obtained by immunization from rattlesnake poison was injected after a bite from the same type of snake.

On the morning of January 27, while cleaning a cage in the Reptile House, Keeper John Toomey was bitten by a large, newly-arrived Texas diamond-back rattlesnake. This was our first accident with a poisonous snake since the opening of the Reptile House in November, 1899, a period of sixteen and one-half years.

Owing to the employment of new measures for the treatment of snake-bite, the history of this case may be of practical value. The large size of the snake involved, which weighed about ten pounds, and the reptile's vigorous condition, seem to render Keeper Toomey's case well worthy of detailed consideration. The unusual features of this case are three: (1) the serious nature of the attack; (2) the injection of a specific anti-venomous serum for rattlesnake bite; and (3) the rapid reduction of the swelling in an enormously distended limb without recourse to drainage incisions.

The accident to Keeper Toomey came during the course of his regular morning work. He was cleaning one of the large easterly cages on the main floor of the Reptile House, in which were quartered several specimens of the big



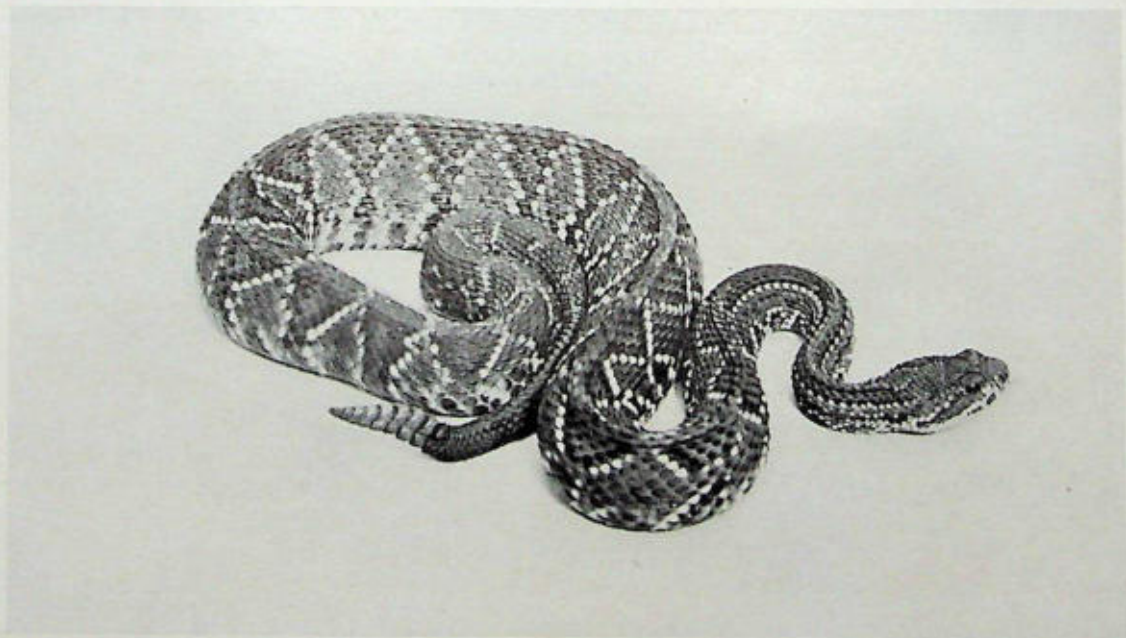
A LANCEHEAD VIPER



DIAMOND-BACK RATTLESNAKE SKULL

western rattlesnake, technically known as *Crotalus atrox*. These snakes were recent arrivals from Brownsville, Texas, and one of them was particularly savage. It is the procedure in cage-cleaning to remove soiled spots in the gravel with a long-handled shovel. In inserting the shovel, Keeper Toomey advanced one hand, palm upward on the shovel-handle, a short distance within the door-frame. From the left rear corner of the cage the snake struck straight across, like a flash. The writer now believes that the fangs were imbedded in the hand near

the base of the thumb. Immediately after the accident the wounds were puzzling. There was one apparently deep wound on the back of the hand, and two rather deep scratches. Where it now appears the fangs were imbedded were two ragged wounds with no definite indication of deeper punctures. All the wounds were freely bleeding, and it was difficult to determine actual fang punctures. It should be understood that a snake of the size involved has quite long anterior teeth in the lower jaw, and that the head, to provide for remarkable distension



SOUTH AMERICAN RATTLESNAKE

in swallowing through loosely connected bone mechanism, is capable of much lateral and vertical distortion in biting.

Within two minutes after receiving the injury, Keeper Toomey's arm had been ligatured above the elbow, and a minute or so after another ligature was applied at the wrist. A cabinet in the Reptile House, always ready for accidents, supplied the surgical rubber ligature that was applied over the lower portion of the biceps muscle. The lower ligature was of thick and soft cord applied in tourniquet fashion. Immediately after application of the ligatures, Senior Keeper Snyder sucked the wounds in an endeavor to draw away some of the poison.

After these immediate, first-aid measures, in which Toomey's fellow-workers expeditiously took matters in hand, Dr. W. Reid Blair, official Veterinarian of the Park, was summoned from his office across the road from the Reptile House. Dr. Blair decided that lancing the fang punctures, as usually is followed in cases of snake-bite, was not advisable, owing to the possibility of great tissue destruction. His contention was further strengthened by doubt as to which of the several wounds were fang punctures, and the disposition of all wounds to freely bleed. He prepared a solution of permanganate of potassium with which all the wounds were repeatedly bathed. In the meantime Dr. Gilbert Van der Smissen, official physician of the Park, had been summoned, and twenty minutes after the accident he arrived with a complete set of instruments for treatment, and a sterilizing tank. He also decided against scarification of the wounds.

The injury occurred at 9:30 a. m. on January 27, 1916, and Dr. Van der Smissen assumed charge of the case at 9:50. The patient at this time appeared normal beyond complaining of intense pain caused by the ligatures. He explained that the bite caused a severe burning sensation in his hand. The physician at once started to fluidify a tube of Calmette's antivenomous serum, prepared at the Pasteur Laboratories at Lille, France. For sixteen years we have kept this serum on hand for emergency, renewing it at regular intervals. It is prepared chiefly for immunization against cobra venom. The serum is in dessicated form, of rather hard, yellowish granules. Reduced to this form the product is placed in cylindrical glass tubes sealed with a flame.

As this was the first time we have had occasion to use the Calmette serum, we were not prepared for the disappointment experienced with its slow solubility. The argument for

dried, dessicated serum is that it is preserved much longer in warm climates; but from our experience the writer would urge the use of fluid serum, even though it must be renewed at more frequent intervals.

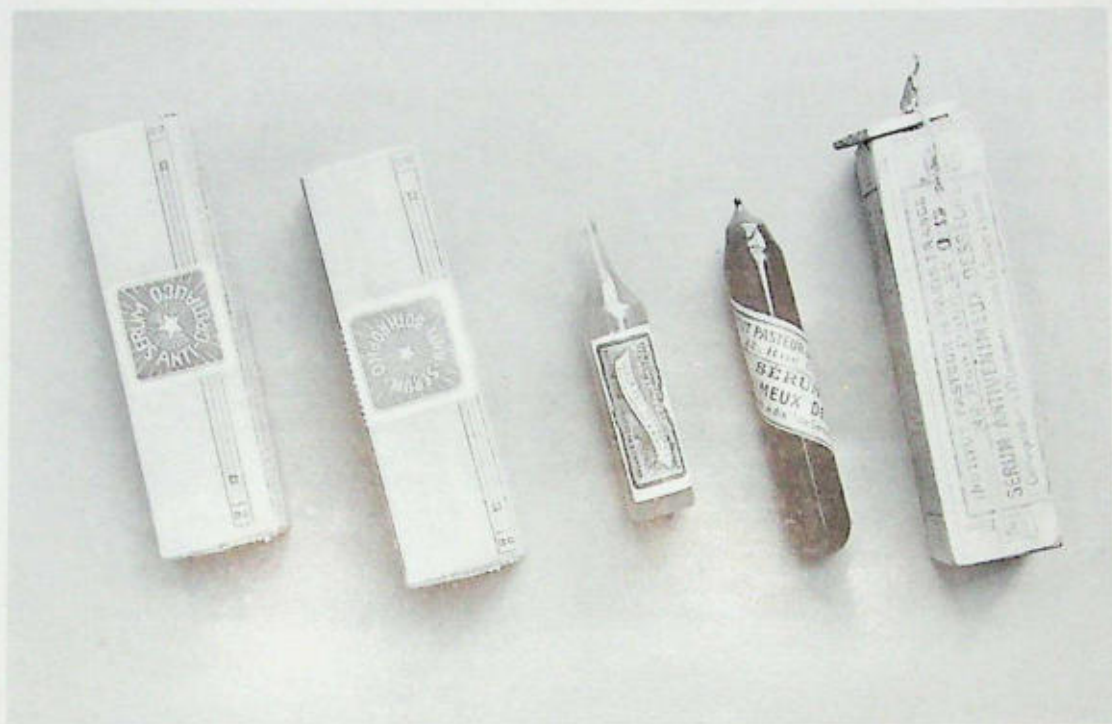
About forty-five minutes of very precious time were consumed in dissolving the serum granules in sterilized water. During this time the patient suffered great pain from the ligatures. It was slightly over an hour after the injury that the patient was given the first hypodermic injection of one tube of dissolved serum. The injection was made under the skin of the abdomen. The ligatures were removed ten minutes later. Meanwhile, washing the wounds with permanganate of potassium had been continued.

Within half an hour after the removal of the ligature the usual symptoms of poisoning from snake-bite developed in the form of profuse perspiration, shivering and vomiting. Moderate doses of brandy were administered at regular intervals, and between them the patient was given liberal drinks of milk, as the stomach appeared to collect and eject a certain proportion of the poison.

At 1 p. m. Keeper Toomey's hand and arm, particularly the former, showed pronounced swelling. He complained of little pain except a burning sensation in the hand, which was not severe. At this time a second injection of Calmette's serum was made.

At 3:30 p. m. the patient was removed by private ambulance to the German Hospital. Between 11 a. m. and 3:30 o'clock there had been administered about a pint of brandy. Vomiting had become very frequent. A pronounced weakness had set in at the time of transference to the ambulance. Severe chills continued. At the time of leaving the Reptile House, however, the patient was quite conscious, and directed the disposition of his clothing, and it is to be recorded that he exhibited no nervousness whatever.

Arriving at the hospital, more alarming symptoms developed. Dr. George Semken, of the hospital staff, now became associated with Dr. Van der Smissen in the treatment of the case. A condition of coma developed and was met by hypodermic injections of strychnine. The arm increased to enormous size, with attendant enlargement of the axillary glands. The swelling quickly extended over half the breast and downward toward the abdomen. Marked discoloration of the swollen area soon followed.



## ANTI-VENOMOUS SERUMS

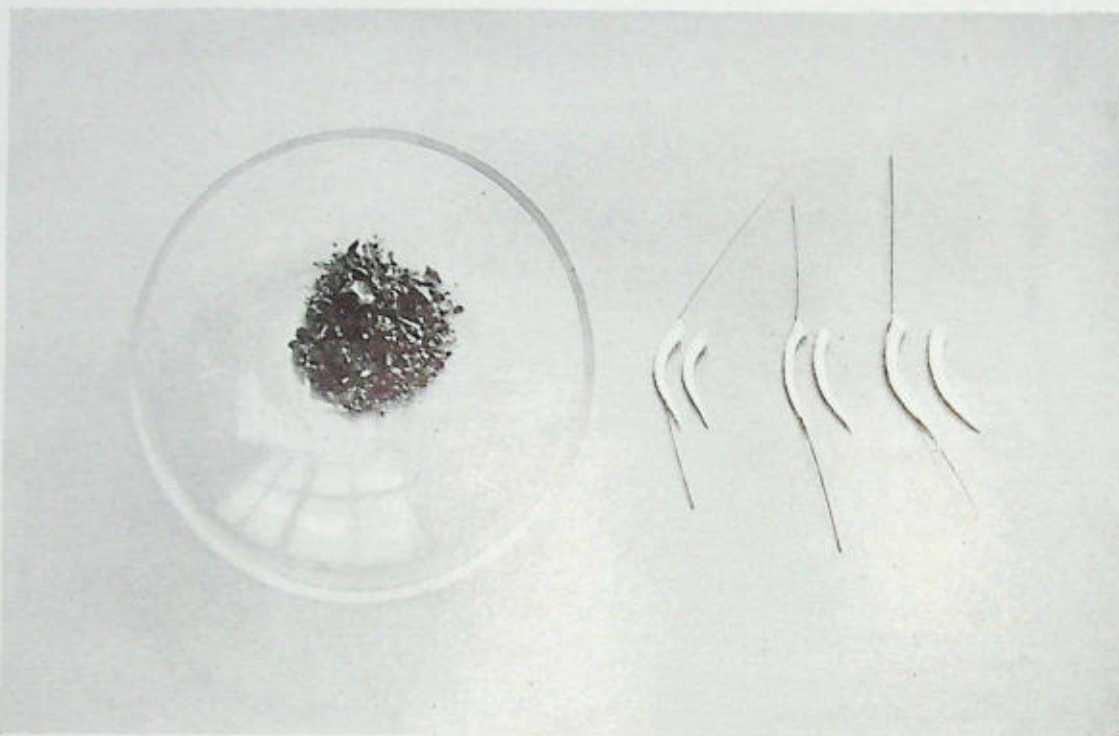
Anti-lachesis and anti-crotalus serums of Dr. Brazil, and Dr. Calmette's serum for treatment of bites of cobras and vipers. The glass tube and container on the extreme right is Calmette.

All the wounds were now thoroughly opened for drainage. The muscles and fatty tissue were under such tension from the swelling that they immediately bulged through the drainage incisions. The absence of dangerous neurotoxic symptoms were attributed to the action of Calmette's serum. Dr. Van der Smissen came in consultation with Dr. Gustav Langmann, who has done much scientific research work with snake poisons. Dr. Langmann stated that Dr. Vital Brazil was then in New York, having come north from the Pan-American Congress, and probably had with him several specific types of anti-venomous serums. On the morning after the injury, Dr. Brazil was located. Fortunately, he had brought with him to the United States, to exhibit at his lectures, tubes of serum obtained by immunization against both lancehead and rattlesnake poison. He at once furnished Toomey's physicians with tubes of the latter, and an injection followed, to combat the formidable haemo-toxic symptoms. The specific rattlesnake serum was in fluid form and was readily injected without any delay.

The effects following the injection of Dr. Brazil's serum were astonishing. Within a few hours there was complete cessation of vomiting

and chills. Within twelve hours the great swelling that had involved the arm and a considerable portion of the body, had decreased one-third, by actual circumference measurement of the arm; and it rapidly receded from the breast. The area of intense discoloration also faded. Return to a normal mental condition with increase of vitality followed these changes. Two days after the injury there was a general consultation to study the case. Drs. Brazil, Langmann, Van der Smissen and Semken were present, and Director Hornaday and the writer also witnessed the dressing of the wounds. Improvement had been so rapid that the area of purplish discoloration had given way to a faint brown tinge, not particularly noticeable. The swelling was hourly decreasing. The wounds presented a gaping and bulging appearance that obviated the necessity of much packing. From all of them there was a profuse serous drainage which literally saturated the dressings. Dressing was with gauze moistened with a mild antiseptic. There was no indication of pus, nor has there been up to the closing of the wounds.

The history of the case at the hospital shows a return of normal conditions, and discharge as convalescent within three weeks. This *resumé*



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, Lancehead snake and Bushmaster. A black hair is drawn through the poison duct of one of each pair.

of the case is prepared ten weeks after the injury. The wounds have practically closed. The slower features of the case relate to the wounds in the ball of the hand, which developed persistent sloughing. During the second week in the hospital this sloughing involved a superficial thumb tendon. Between the two major wounds was a channel permitting free access to a probe. Granulation tissue commenced rapid building up in the sloughed-out area about the fifth week, and we anticipate that the final result will be very satisfactory. Wrist and finger motions are now nearly normal, with the exception of some stiffness in the thumb, which now is receiving massage and mechanical treatment.

Summing up this case, it is appropriate to again point out the surprising reduction of the swollen arm without recourse to drainage incisions, and the pronounced and beneficial effect of a single injection of the \**anti-crotalico* serum from the laboratory of Dr. Brazil. Also, it is important to point out the absence of marked neuro-toxic symptoms before the injection of Dr. Brazil's serum, which good effect was undoubtedly produced by the injection of Calmette's product, although this apparently failed

to check the developing haemo-toxic symptoms. That a fluid serum is also much preferable to a desiccated form, is pointed out by the delay in fluidifying the Calmette remedy. The Pasteur Laboratories of America, however, now explain to the writer that they are preparing serum in fluid form.

The treatment of the case of Keeper Toomey demonstrates the fact that Dr. Brazil's method of producing specific anti-venomous serums in fluid form for the bites of different types of poisonous snakes is the radically successful method of snake-bite treatment. Profiting by our experience in this case, through the courtesy of Dr. Brazil we have now stocked our surgical cabinet in the Reptile House with tubes of *anti-lachesis* and *anti-crotalus* serums. The former serum, so we believe, would be highly efficacious for the bites of such snakes as the moccasin, copperhead or the Old World tree vipers, besides the reptiles of the South American genus *lachesis* for which it is specifically made. The *anti-crotalus* serum covers the treatment of bites from the several species of rattlesnakes, and could be used for the larger Old World vipers which have a similar poison. With Cal-

\*This is the name by which this serum is designated by Dr. Brazil.

mette's serum at hand we have a similarly valuable agent for the treatment of injuries from cobras, the American coral snakes, the many Australian elapines (cobra types) and the like. While this arrangement is not ideal, it is probably as far as we will go in many years in obtaining specific anti-venomous serums. It at least provides us with selections of three serums obtained from immunization with venom of markedly different ratios.

#### ITEMS OF INTEREST.

*Our Active Beavers.*—For the past year there has been a marked difference of opinion between the men in the Forestry Department and our beavers. When we constructed the beaver enclosure and regulated the drainage of the pond, a pipe was placed near the top of the dam, where the animals so industriously work. The object of this pipe was to form a sort of spillway for the dam-work to be designed and executed by the beavers. To prevent the pond from overflowing its banks, it is quite necessary to keep the pipe open. That necessity is constantly combated by the beavers, which persistently stuff the pipe full of twigs, leaves and mud to prevent it from performing its function. As it takes several days for the beaver to completely block the pipe, it is cleaned out at intervals a few days apart.

The night after the drain has been cleared is a busy one for the beavers. In their first rush to combat the change, and stop a wicked waste of perfectly good water, they use every kind of debris available. Even corn husks are not scorned in the reconstruction work. To give an idea of difference of opinion between the men who keep the spillway open, and our beaver engineers, the pile of debris that has accumulated after systematic removal has been photographed and is herewith published.

*An Agile Tahr Family.*— There is no more interesting sight in the Park than the antics of the tahrs. These Himalayan goats, that are quartered on Mountain Sheep Hill, have been provided with a series of steps that lead to the lower branches of an enormous tree—an oak, with wide-spreading horizontal branches. For months the gambols of these mountaineers on the large branches of the oak have provided a spectacular novelty. Of late the tahrs have become more daring, and have been ascending to boughs about twenty feet from the ground. Their movements are so agile, yet erratic, that we have at times worried about a possible fall and serious injury. It appears that these animals have studied carefully the possibilities in

leaping to higher branches, and from thence safely descending. Anxious visitors often seek a keeper to have him assist an animal in descending, and upon returning are usually amazed, after patient watching, to observe the object of their solicitude rapidly descend the tree for a distance of six or eight feet, alight upon a lower branch, then calmly survey his corral-mates that may be frisking along the rocky ledges far below.

*Reproduction of Legs in a Salamander.*—We have under observation in the Reptile House a very interesting specimen of the Austrian newt—a salamander-like creature that is reproducing fore and hind limbs on its left side. This creature was attacked by a larger specimen and both limbs were bitten off close to the body. The remarkable power of complete reproduction of the limbs among the tailed amphibians is well known, but the writer has never observed so interesting an example. From the rapidly closing wounds on the amphibian's body sprouted miniature appendages of perfect form except for shortened digits. In the early stage of reproduction, the minute limbs might have belonged to a creature of one-sixth the size. When the limbs were one-half the size of the normal ones on the opposite side, it was apparent that all muscular and tendon connections had been perfectly reproduced as the newt actually walked, though rolled to one side in order to bring the new limbs in close contact with the ground. The entire reconstructive period, to the full size of the new limbs, will cover a period of about three months.

*Anthropoidal Temperament.*—Two of the chimpanzees now on exhibition in the Park are radically different in disposition from any examples previously exhibited. Neither animal will permit the keeper to handle him. With all our chimpanzees of the past there was always a demand on the animal's part, when ever the cage was opened, to be carried in the keeper's arms like a human infant. "Koko" and "Boma" are different types, the former is of the black-faced-species and the latter and smaller specimen represents a pale-faced species or subspecies, according to the weight of opinion. The black-faced chimpanzee was collected by Mr. Richard L. Garner, while in quest of the gorilla. "Boma" was purchased from an animal dealer. It is not surprising that "Koko" is wary about making friends, for Mr. Garner explains that a malicious native stabbed the animal while in a fit of rage. Possibly the smaller anthropoid has suffered equally disagreeable experiences. At any rate, all our efforts to make friends are

unavailing. Both chimpanzees will permit a hand to touch them through the cage-work, but they seem to consider this barrier necessary for their safety. "Koko" is always maliciously anxious to induce some one to trust a hand within his reach, whereby several fingers might be bitten off. "Koko" is likely to become very troublesome.

*Prairie Dog House-cleaning.*—Impatient of the frequent and abnormal snowfall of the early spring, and feeling the effects of the steadily warming rays of the sun, the prairie dogs did not wait for the ground to become bare, but commenced an early spring chattering. It is an unusual thing to see these rodents above ground when the latter is covered with snow. It is, however, a still more unusual sight to see these cheerful little animals shoveling snow, from their burrows, making it fly like earth, but this was several times observed in early March. That the prairie dogs are not comfortable in snow is very apparent from the way they shake the flakes from their feet. Naturally these little animals were impatient for the bare ground of March, when there is a general house-cleaning in prairie dog town. They were determined to commence on time, despite a foot of snow and its attendant discomforts.

*Pacifying the Jack Rabbit.*—For the past eight months we have succeeded in keeping the western jack rabbit on exhibition. All previous attempts with this excessively nervous animal have been failures. New arrivals frantically try to escape, and become so frenzied they run blindly against the cage-work and suffer fatal injuries. A specimen which arrived last summer was given a big box in which to hide, and gradually we made friends with him by enticing him out with food. When he began investigating his yard without symptoms of panic, another specimen was ordered from the West. The second specimen at once gathered confidence from the calm demeanor of the first, and the pair now live happily. Visitors are at once interested in these animals, owing to the rabbits' grotesque ears, which are of enormous size, and according to the mood of the animal are directed at eccentric angles. This successful experiment of maintaining the species has led us to consider plans for a colony of jack rabbits. The idea is to exhibit them in a roomy enclosure like that of the prairie dogs.

*Under-Sea Instinct.*—We cannot remember a winter for many years when persistent cold over such lengthy periods froze our ponds and pools to such a depth as in 1916. On larger bodies of water it was impossible to keep open

a greater area than mere air-holes. This has been the condition of the big sea-lion pool and incidentally has worried many visitors who have thought the animals would drown. To those uninitiated into the ways of these creatures, it is disconcerting to see the big Stellar sea-lion plunge into an opening of the ice about four feet in diameter, note the agitation of the small area of water absolutely cease, then look over the large surface of solidly-frozen pool. Visitors reason that the animal can never find its way back to the opening, but after several minutes of painful suspense the object of apprehension pokes out his head, barks vigorously for his associates to join him, then dives again.

*Ante-Seasonal Moths.*—With snow and cold outside, it was quite a novelty to see many large and gorgeously-hued moths fluttering about the main hall of the Reptile House. Under normal conditions the cocoons containing these creatures would be in the trees exposed to cold weather and the emergencies of the insects would not take place until the balmy weather of June. The tropic atmosphere of the Reptile House, brought about by high temperature and also the humid conditions occasioned by the evaporation of the pools, causes our butterflies and moths to emerge in mid-winter and early spring. These specimens are preserved for souvenirs, which may be obtained at the Bureau of Information in the Lion House.

*An Incurable Giraffe.*—A well-known trait of captive giraffes is to get into all kinds of unnecessary trouble unless ceaseless vigilance of the keeper eliminates all possibility of mishaps. Sometimes giraffes develop traits that point to future trouble, and that must therefore be forestalled. Owing to the habit of our present specimen of standing with his fore feet in the porcelain drinking trough, two feet from the floor, we built a protecting wooden ledge to prevent him from slipping out of the smooth basin. He then developed a disposition to thrust his elongated forelimbs so far through the front bars of his cage that it was necessary to cover the lower part of the cage with wire netting. Persistently bumping his nose against a door ledge was counteracted by a rounded moulding. When he started to rub the hair from his neck on an iron brace about twelve feet from the floor, this was duly prevented, and then the animal started to gnaw the door frame. With the wood protected with sheet metal, the giraffe concentrated his attention upon the plaster top of a column, from which he playfully bit generous fragments. We covered the top of the column with wire mesh, and next morning



BRANCHES REMOVED FROM THE BEAVER DAM SPILLWAY

This pile represents about twelve months labor by the beavers in filling the opening of the spillway.

were horrified to find that he had so demoralized the mesh with his teeth that numerous wires stuck out in all directions like porcupine quills, and precisely on a level with his eyes. Fortunately his eyes were not injured; and then the column top was covered with heavy sheet-metal. We anticipate further and varied developments, at any time.

*The Self-Made Troubles of a Deer.*—In the gentle art of getting into trouble one of our specimens of Hangul deer rivals the giraffe. During the last three years scarcely a month has passed wherein this powerful and savage animal has not made it necessary to call keepers to extricate him from awkward situations of his own creating, or summon the wire-workers to make repairs. Though in a spacious yard with a number of trees, and with every opportunity to take exercise, this animal's favorite pastime is to lunge at the fence in an endeavor to break the vertical wires. We have twice noosed him in order to remove portions of tree boxes which he viciously charged and tightly wedged upon his antlers. Once after a storm, during which telephone wires were blown down, he managed by diligent worrying of a wire to wrap about twenty-five feet of it tightly about his head and antlers. It was necessary to tie

him to the fence in order to cut away the tangle. He afterwards repeated the wire exploit by tearing out a mesh partition. Recently, by thrusting his muzzle between two gate posts he managed to run a gate hook through his upper lip. The hook was attached to a chain, but fortunately the latter came loose without tearing the animal's mouth. A squad of keepers drove the maddened deer to a corner of the corral, where a lasso over his horns brought him to the fence. The hook was removed with difficulty, and the injury quickly healed. In adjoining yards, of quite similar construction and condition, our large elk herd, containing several vigorous bucks, has lived for sixteen years without any of the troubles that so often have been invented by the Hangul deer.

*The Animal Hospital.*—The interior fittings of the new animal hospital and pathological laboratory are rapidly being completed, and the building will be ready for use this spring. This building is an important addition to Dr. Blair's department. It contains a number of large and small cages, quarantine facilities, exceptionally well-lighted operating and dissecting rooms, and is fitted throughout with the latest type of electrically operated ventilators. A full description of it will appear later on. R. L. D.

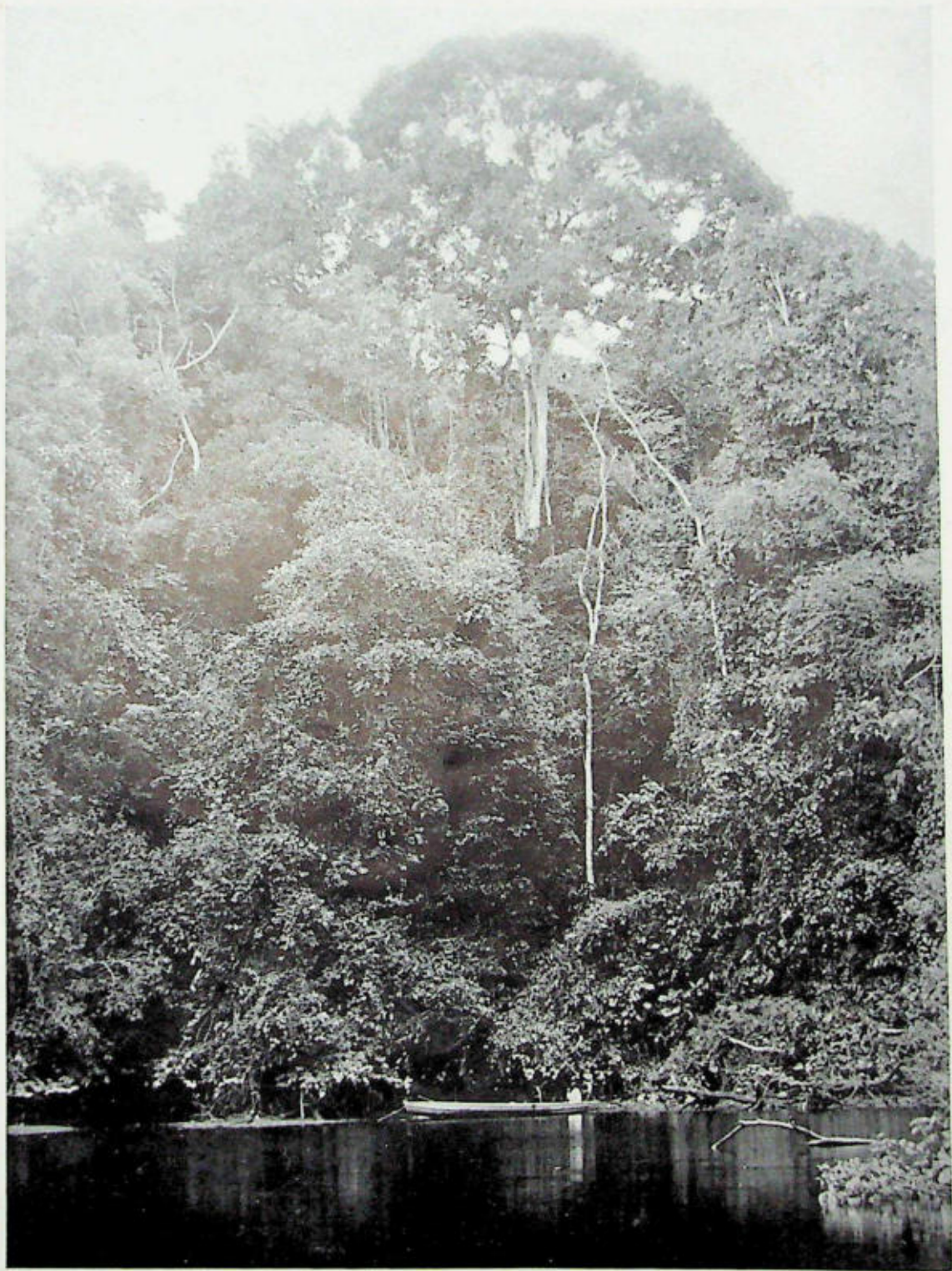


RED-BREASTED MERGANSER

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TROPICAL FOREST

Scene on the Mazaruni River, near the Society's Research Station.

# ZOOLOGICAL SOCIETY BULLETIN

*Published by the New York Zoological Society*

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Vol. XIX

JULY, 1916

NUMBER 4

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## THE ESTABLISHMENT OF THE TROPICAL RESEARCH STATION

*By* WILLIAM BEEBE.

WITHIN one month after our party left New York City, the Tropical Research Station of the New York Zoological Society became an established fact, and the succeeding weeks have proved the wisdom and success of the undertaking. As in all types of exploration, the dominant factor in this work was uncertainty; the impossibility of knowing what each day would reveal of error or achievement. But our own single-mindedness of purpose, combined with the unanimous goodwill and sympathy of the people of Guiana, left no doubt of ultimate success.

The most difficult thing throughout was to resist the lure of many openings and invitations which seemed to offer opportunities almost equal to the ideal with which I had set out. Grenada embodied one's ideal of a tropical island, and when a short walk revealed rhinoceros beetles and hummingbirds' nests and an abundance of strange birds, it seemed well worth while to spend a month there. Trinidad was still more of a temptation. Here were men—most hospitable and as full of the joy of scientific work as ourselves, and here was a great island which I knew from former experience to be teeming with interesting forms of life from sea-beach to mountain-top. But it was an island, and the headlands of Venezuela were in sight.

My ambition for the Zoological Society's Station was to have a continent to draw upon. So with real regret we continued our voyage

and reached Georgetown. The big kiskadees shouted welcome from the unlovely corrugated roofs of the stellingen, just as they did seven years before. And during all this time the Botanical Gardens had lost no whit of beauty, nor the people aught of their whole-souled sympathy and generous hospitality.

We found a house and servants awaiting us, and here we made our headquarters. We began work in the Gardens but soon found that this and the surrounding country, however well adapted to certain forms of life and to sugar plantations, offered too limited a field for our investigations. I began a series of short trips in various directions, radiating from Georgetown as fingers radiate from a palm. And again came the temptation to select one place or the other as being almost all that we could desire. We found interesting Indian villages up the Demerara with good second-growth jungle close at hand. Far beyond the Essequibo River we motored to the end of the Pomeroun Trail, where great moras and kakerallis towered overhead, and we were almost persuaded.

Then one day, in a downpour of rain, I followed an old river trip of mine, made years ago, up the Essequibo to Bartica. Here I knew at last that the Station would find a worthy home. I returned at once, purchased a houseful of furnishings and without a moment's delay we packed up again and trekked inland. So swiftly did we work, that even in this slow-moving tropic land we were able in

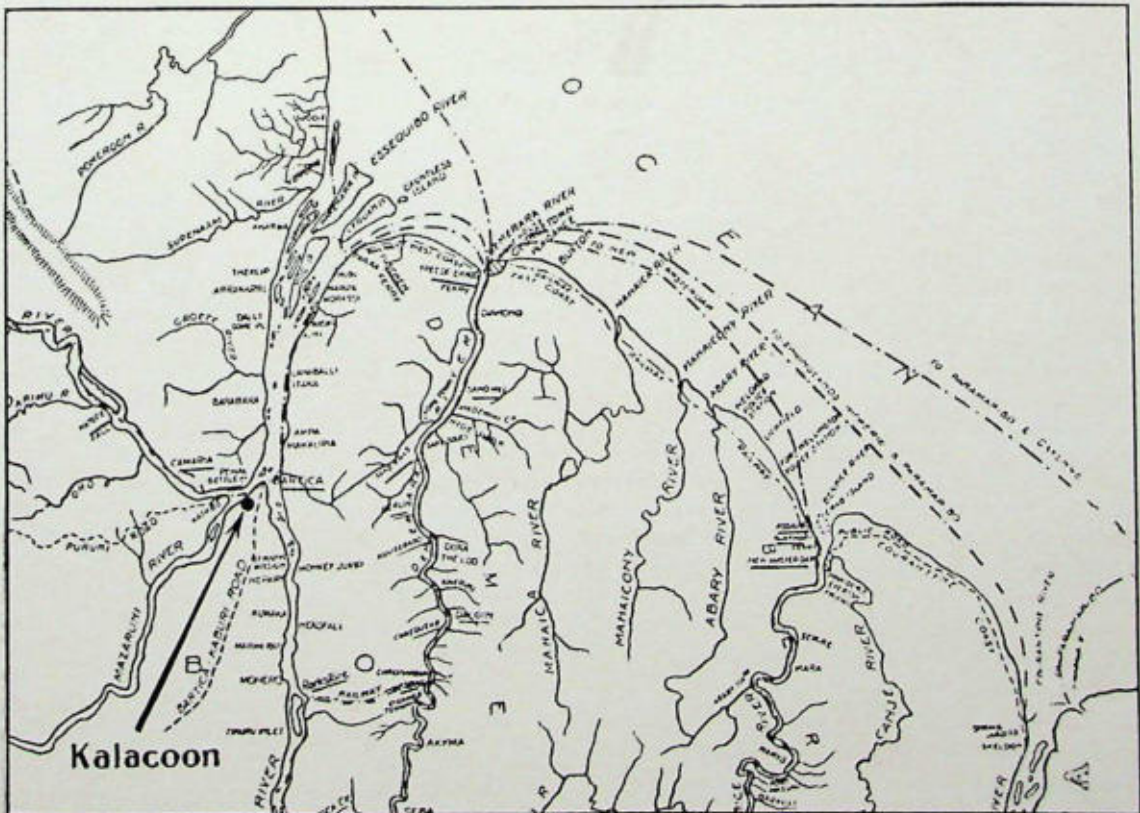


TWO VIEWS OF KALACOON  
The Society's Research Station in British Guiana

three days' time to entertain our first guests, Colonel and Mrs. Theodore Roosevelt and Mr. and Mrs. Withers.

To make our manners properly to all those who have aided us would be equivalent almost to a roster of the inhabitants of Georgetown. I cannot refrain from mentioning the names

of Governor and Lady Egerton, Prof. Harrison, Mr. Rodway, Mr. Clementi, Hon. J. J. Nunan, Mr. and Mrs. Hayes, Mr. Goring and Mr. Cunningham in Georgetown, and Mr. Frère and Mr. Withers in the vicinity of Kalacoon. To Mr. Withers we are indebted for Kalacoon itself on the Hill's Estate, rent-free. For this



SKETCH MAP OF A PORTION OF BRITISH GUIANA



KALACOOON LABORATORY  
View from the East

and a score of other kindnesses, words fail to express adequate appreciation. We prefer to feel that the gift is one to science, which we, the benefitters, can repay only by the hardest, most sincere work of investigation of which we are capable.

Kalacoon is a very large, two-storied house built on a rather abrupt hill, some two hundred feet above the Mazaruni River. The laboratory room, on pillars fifteen feet above the ground, is thirty by sixty feet with sixteen windows. Two miles below the house the Mazaruni enters the equally large Essequibo; while the mouth of the Cuyuni River is the same distance above. Kalacoon faces northeast, and the view from the front is magnificent. All three rivers are visible, together with nine islands. To the east lies the rubber plantation of Mr. Withers, and across the river the tiny group of compact, attractive buildings of the Government Rest House and the Penal Settlement. Beyond these and toward all other points of the compass, solid jungle covers the rolling hills.

No more central spot could be found, nor one more delicately balanced between the absolute primitive wilderness and those comforts of civilization which mean continual health and the ability to use body and brain to the full. Three times a week a little steamer brings ice, fresh vegetables and mail. We can reach Georgetown in five minutes by telegraph and New York half an hour later by cable, while the steamer trip to Georgetown takes only seven hours. Yet no one, save an occasional government official, a tent-boat of negro gold-diggers, or the wood-skin of an Indian, passes us. Our Indian hunter finds an abundance of meat for the table within a mile or two of the house, and I was recently charged by a jaguar only a few hundred yards away. I shall reserve for other articles an account of the common creatures which surround us. The shortest walk often furnishes material for days of research. For longer expeditions we have launches at our disposal for ascending the rivers to the rapids and falls, while Mr. Wither's motor car climbs the most impossible hills and finds its way along trails which other-



ANOTHER VIEW OF KALACOOON LABORATORY

wise are traversed only by naked Akawai and Carib Indian hunters.

For those who think of the tropics as a place of constant danger and disease, I may say that mosquitoes and flies, malaria and other fevers are absent. A cool breeze blows most of the day; the temperature varying from 68° to 93°. At night a heavy blanket is a necessity. A few poisonous snakes are to be found, but only after long searching. I have seen two in two months. A lantern, turned low, keeps away the vampires, and while *bête rouge* are annoying they are easily guarded against. Under such conditions it is possible, as we are proving, to work hard day after day, month after month, and remain unpoisoned, unbitten and in good health.

The one, terrible disadvantage, the one thing which no planning or finance or forethought can alter, is the pitifully inadequate ability of each of our human brains to cope properly with a tithe of the specimens which accumulate, or to understand and translate into logical explanation more than the merest fraction of the mass of strange facts and phenomena which fill our minds and note-books.

## NOOSING A BUSHMASTER.

*By* WILLIAM BEEBE.

OUR Akawai Indian hunter, two nestling trogons and Easter eve—these things led to the capture of the Master of the Bush. For nothing in the tropics is direct, premeditated.

My thoughts were far from poisonous serpents when Jeremiah came into our Guiana laboratory late on a Saturday afternoon. Outdoors he had deposited the coarser game intended for the mess, today, consisting of a small deer, a tinamou or maam and two agoutis. But now with his quiet smile, he held out his lesser booty, which he always brought in to me, offering in his slender, effeminate hands his contribution to science. Usually this was a bird of brilliant plumage, or a nestful of maam's eggs with shells like great spheres of burnished emeralds. These he would carry in a basket so cunningly woven from a single palm frond that it shared our interest in its contents. To-day, he presented two nestling trogons, and this was against rules. For we



VIEW NORTHEAST FROM KALACOOON

Three rivers and nine islands are visible in this direction

desired only to know where such nests were, there to go and study and photograph.

"Jeremiah—listen! You sabe we no want bird here. Must go and show nest, ch?"

"Me sabe."

Accompanied by one of us, off he started again, without a murmur. In the slanting rays of the sun he walked steadily down the trail from Kalacoon as if he had not been hunting since early dawn. An hour passed and the sun swung still lower when a panting voice gasped out:

"Huge labaria, yards long! Big as leg!"

The flight of queen bees and their swarms, the call to arms in a sleeping camp creates somewhat the commotion that the news of the bushmaster aroused with us. For he is really what his name implies. What the elephant is to the African jungles, this serpent is to the Guiana wilderness. He fears nothing—save one thing, hunting ants, before which all the world flees. And this was the first bushmaster of the rainy season.

Jeremiah had been left to mount guard over the serpent which had been found near the trogon tree. Already the light was failing; so we walked rapidly with gun, snake-pole and canvas bag. Parrakeets hurtled bamboowards to roost; doves scurried off and small rails flew from our path and flopped into the reeds. Our route led through the open-trailed rubber plantation of the Hill's Estate toward the edge of the high bush, and we did not slacken speed until we were in the dim light which filtered through the western branches.

At the top of a slope we heard a yell—a veritable red Indian yell—and there our Akawai hunter was dancing excitedly about, shouting to us to come on. "Snake, he move!" We arrived panting, and he tremblingly led me along a fallen tree and pointed to the dead leaves. I well knew the color and pattern of a bushmaster. I had had them brought to me dead and had killed them myself, and I had seen them in their cage behind glass. But now, though I was thinking bushmaster and looking bushmaster, my eyes insisted on registering

dead leaves. Eager as I was to begin operations before darkness closed down, it was a full three minutes before I could honestly say—"This is leaf; that is snake."

The pattern and pigment of the cunningly arranged coils were that of the jungle floor, anywhere; a design of dead leaves, reddish-yellow, pinkish, dark brown, etched with mold, fungus and decay, and with all the shadows and high lights which the heaped-up tissues throw upon one another. In the center of this dread plaque, this reptilian mirage, silent and motionless rested the head. I knew it was triangular and flattened, because I had dissected such heads in times past, but now my senses revealed to me only an irregularity in the contour, a central focus in this jungle mat, the unravelling of which spelt death.

It was a big snake, seven or eight feet long and heavy bodied—by no means a one-man job. Again we carefully examined the screw-eyes on the pole, and each looked behind for a possible line of escape.

I quickly formed my method of attack. Jeremiah was sent to cut forked sticks, but his enthusiasm at having work to do away from the scene of immediate conflict was so sincere that he vanished altogether and returned with the sticks only when our shouts announced the end of the struggle. An Indian will undergo any physical hardship smiling, and he will face any creature in the jungle, except the bush-master.

We approached from three sides, bringing snake-pole, free noose and gun to bear. Slowly the noose on the pole pushed nearer and nearer. I had no idea how he would react to the attack, whether he would receive it quietly, or, as I have seen the king cobra in Burma, become enraged and attack in turn.

The cord touched his nose, and he drew back close to some bushy stems. Again it dangled against his head, and his tongue played like lightning. And now he sent forth the warning of his mastership—a sharp *whirrrrr!* and the tip of his tail became a blur, the rough scales rasping and vibrating against the dead leaves, and giving out a sound not less sharp and sinister than the instrumental rattling of his near relatives.

For a moment the head hung motionless, then the noose-man made a lunge and pulled his cord. The great serpent drew back like a flash, and turning, undulated slowly away toward the darker depths of the forest. There was no panic, no fear of pursuit in his move-

ments. He had encountered something quite new to his experience, and the knowledge of his own power made it easy for him to gauge that of an opponent. He feared neither deer nor tapir, yet at their approach he would sound his warning as a reciprocal precaution, poison against hoofs. And now, when his warning had no effect on this new disturbing thing, he chose dignifiedly to withdraw.

I crept quickly along on one side and with the gun barrel slightly deflected his course so that he was headed toward an open space, free from brush and bush-ropes. Here the pole-man awaited him, the noose spread and swaying a few inches from the leaves. Steadily the snake held to his course, and without sensing any danger pushed his head cleanly into the circle of cord. A sudden snap of the taut line and pandemonium began. The snake lashed and curled and whipped up a whirlpool of debris, while one of us held grimly on to the noose and the rest tried to disentangle the whirling coils and make certain of a tight grip close behind the head, praying for the screw-eyes to hold fast. Even with a scant inch of neck ahead of the noose, the head had such play that I had to pin it down with the gun barrel before we dared seize it. When our fingers gained their safe hold and pressed, the great mouth opened wide, a gaping expanse of snowy white tissue, and the inch-long fangs appeared erect, each draped under the folds of its sheath like a rapier outlined beneath a courtier's cloak.

When once the serpent felt himself conquered, he ceased to struggle; and this was fortunate, for in the dim light we stumbled more than once as we sidled and backed through the maze of lianas and over fallen logs.

Jeremiah now appeared, unashamed and wide-eyed with excitement. He followed and picked up the wreck of battle—gun, hats and bags which had been thrown aside or knocked off in the struggle. With locked step, so as not to wrench the long body, we marched back to Kalacoon. Now and then a great shudder would pass through the hanging loops and a spasm of muscular stress that tested our strength. It was no easy matter to hold the snake, for the scales on its back were as rough and hard as a file, and a sudden twist fairly took the skin off one's hand.

I cleaned his mouth of all dirt and debris, and then we laid him upon the ground and, without stretching, found that he measured a good eight feet and a half. With no relaxing of care we slid him into the wired box which

would be his home until he was liberated in his roomier quarters in the Reptile House of the Zoological Park.

There is little doubt but that bushmasters hibernate, or at least hide themselves away during the dry seasons. When the rains begin, they appear, but spend most of their time coiled flatly among dead leaves in the dark jungle. Unless actually stepped upon they will not strike at a passing man or large animal. The next one I came across proved this. A few days after we caught the big fellow, I was walking in another part of the forest and found one less than four feet long. Hope, one of my convict trail-cutters, was walking ahead when something impelled me to look down. There at my feet was the dread spiral, which Hope had stepped directly over. He had even flicked a leaf with his bare foot partly across the head of the snake. When I called to him and told him, he leaned against a tree and turned as pale as his pigment would allow him.

I had no cord, and was a long distance from home, so I cut a light reed and with a slight blow on the neck disabled the snake so that he was quite harmless. It is astonishing how slight a tap will derange that wonderful chain of vertebrae which forms almost the entire skeleton. I realized why it is that for all their deadliness, these serpents recognize discretion as the best policy in their meetings with creatures of large size.

I do not think that in these dark jungles bushmasters are especially nocturnal. They seem to move about regardless of the time of day or night. But their movements are slow, and rather than pursue their prey, their forte in life is waiting, with all the patience in the world, for some small creature to cross the spot which they have rendered more deadly than any pitfall or trap of human devising.

#### THE COCK-OF-THE-ROCK.

A SUPERB, adult male Cock-of-the-Rock, (*Rupicola rupicola*) has just come to us from the Tropical Research Station, established in British Guiana by the Zoological Society. It is the first specimen of its genus to reach us, and is the most valuable accession among the birds received so far this year.

The Cock-of-the-Rock belongs to the family *Cotingidae*, the chatterers, and is allied to the bell-bird and the umbrella-bird. Four forms, all from northern and western South America,

are recognized. The range of the species represented by our bird extends through Venezuela, British Guiana and northern Brazil. It occurs very locally in mountainous portions of the interior, and appears to be nowhere abundant. It has been more or less persecuted by feather hunters, but its habitat is so inaccessible that it seems unlikely that it has suffered very considerably from this cause. The Indians use them to some extent in their feather ornaments, but seem to prefer the beaks and plumage of toucans and macaws.

An interesting habit of the Cock-of-the-Rock is its gathering in parties at the beginning of the breeding season. A suitable spot is selected, and the males, ranged in a circle, perform a curious dance, each springing from a low branch to the ground and returning with a quick leap. A circular space is soon cleared of leaves and other debris, leaving a clean, well-packed ring, which is easily recognized.

The male Cock-of-the-Rock is a deep orange, with black wings and tail. The head is ornamented with a long, perpendicular crest, composed of two portions, one of which rises from each side of the head, meeting in the center. The outer secondaries of the wing are produced into long, decorative filaments. The female is a sombre brown, tinged here and there with orange.

The plumage of the Cock-of-the-Rock, like that of many other red and orange birds, fades in captivity. Our present specimen is slightly duller than a wild bird, but still is very brilliant. These birds, on rare occasions, have been taken to England, the largest arrival being six birds from British Guiana in 1911. From all accounts, they are not among the hardiest of captives, and no great success in keeping them has been attained. Our bird, however, has been in captivity for some months, and shows every evidence of perfect health.

L. S. C.

*A Hybrid Bear.*—Sometime ago the BULLETIN announced the birth of an interesting hybrid bear, the parents being a Russian brown bear (mother) and the long-eared sloth bear. At that time the infant was in the den with the mother, and there was much speculating as to what its characteristics would be when it did appear. This young bear is now rollicking about the den, and is quite remarkable in form and coloration. It is black like its male parent, with an exceptionally elongated head and long ears. Its antics add much to public interest in our collection of fun-producing bears.

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**ZOOLOGICAL SOCIETY BULLETIN**


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Published *bi-monthly* at the Office of the Society,  
111 Broadway, New York City.

Yearly by Mail, \$1.00.

MAILED FREE TO MEMBERS.

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ELWIN R. SANBORN,

*Editor and Official Photographer*

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VOL. XIX, No. 4.

JULY, 1916

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## GREAT SEIZURES OF BIRDS' PLUMAGE.

### ILLICIT TRADE IN BOMBAY

From The Madras Mail, May 10, 1916.

Bombay, 9th May.—A few figures are published showing that the Customs Preventive Department at this port have during the past year been highly successful in stopping the trade in the illicit export of birds' plumage. Ten exporters have come within their grasp, and from these were seized egret plumes worth Rs. 2,19,047 in India and £44,000 in London. The rupee value represents the sum which the exporters paid to those who took the feathers from the birds. So the loss to the trade was considerable. In addition penalties varying from Rs. 5,000 to Rs. 10,000 each, and amounting altogether to Rs. 59,175, were inflicted on these men, and over Rs. 52,000 of this sum has been recovered. Sometimes large captures are made. During the past fortnight, for example, feathers worth Rs. 14,400 were seized in course of export and the exporter detected. The Preventive Department believe that they destroyed about 90 per cent. of the trade last year. But the profits are very large and the despatch of parcels is beginning again.

There appears to be a serious defect in the law on the matter. When an exporter is discovered—no easy matter, for feather correspondents do not sign their letters with their true name—the Customs Department can, on a Magistrate's warrant, have his house searched and seize the feathers found there to produce as evidence that he is engaged in the trade. But they have to return the feathers and can only take possession of them if they are discovered in the course of export.

Editorial in The Madras Mail.

We referred the other day to the great difficulty there is in stopping the illicit trade in birds' plumage, owing to there being no reciprocal Act in the United Kingdom prohibiting the importation of such articles, because of the political influence of the trade that deals in these goods. A telegram which we publish to-day, from Bombay provides further evidence of this fact. Judging by the figures given, the trade is a valuable one since the consignments of only ten exporters was valued at £44,000 in the Lon-

don market. What it must have been before the Act passed by the Government of India we can well imagine, also the wholesale destruction and cruelty entailed by the trade.

It is a comment on the policy of the Home Government who, before the war, were feverishly on the look-out for all sorts catch-vote, mock philanthropic schemes to legislate about and waste money on, but refused to suppress an evil the existence of which was patent to all. This being the case, it remains for us in India to exercise jealously the power we possess under the Act, especially as there is an indication that, taking advantage of the preoccupation and, possibly, a certain amount of disorganization that exists now on account of the war, the trade is getting more active again. One way in which this can be done is to remedy the defect in the law which has been discovered in Bombay, which prevents feathers and plumage seized on search in a suspected exporter's premises from being confiscated or destroyed.

Under the Act, possession of these goods is not an offense, which only becomes established when the exporter attempts to ship the goods, and they are then seized by the Customs preventive agency. This surely is an anomaly in a law which has for its object the prevention of the destruction of beautiful wild birds in India for their plumage.

This plumage has practically no market value in India, so a man discovered with large quantities of it in his house or on his person should be presumed to be keeping it there for export purposes, and it should come under the provisions of the Act which authorises confiscation.

We believe that the Editor of the *Mail* is unaware of the fact that despite the fierce opposition of the London feather trade, aided by certain misled zoologists, the Hobbouse (government) bill to prohibit the importation of wild birds' plumage had gone to a fourth reading, and unquestionably would have been finally passed by Parliament had the outbreak of the European War been deferred *only two weeks!* The British government was really in the act of doing its whole duty to the birds of the world.—*W. T. H.*

*A Runaway Monkey.*—A certain number of our monkeys, that have been presented to the Park, have been much petted by their former owners. In consequence they have been given more liberties than the wilder specimens, and while the keepers are cleaning their cages, they are permitted, sometimes, to run about the building. Quite recently, an animal of this kind—a medium-sized rhesus monkey—became frightened and dashed outside. The keeper called to it, but a passing cart added to the animal's excitement and it fled into the woods with Keeper Engelholm in close pursuit. The monkey led the chase to the Bronx River at its widest part, and keeping a straight course, plunged into the water and struck out for the

farther shore like a veteran swimmer. Shouts for assistance brought a man to the opposite bank, who deflected the animal's course. The pursuers and the monkey turned up the river and covered a distance about equal to a city block. The keepers followed along the bank and at last the animal headed in and surrendered. He was out of breath and altogether meek, but otherwise did not show any indication of distress from his aquatic manoeuvres.

### THE STORY OF OTA BENGA, THE PYGMY

By SAMUEL P. VERNER

THE news of Ota Benga's sad death shocked and grieved me, especially as I had not heard from him in a long time, owing to the distance and conditions which have separated us. His case is strangely like that of the devoted companion of David Livingstone, Skeletu, who jumped overboard from the ship on which he was traveling with the great explorer, apparently rendered suddenly insane by the marvels of civilization as they grew upon him. But Ota Benga, although of the most primitive of all African races, endured the struggle with civilization much longer, and probably succumbed only after the feeling of utter inassimilability overwhelmed his brave little heart.\*

He was the first of the pygmies that consented to come to America, and so was the first that ever left his native wilds to see what the white man's country was like. Ota Benga was from an entirely distinct settlement from the other pygmies, who came from the town of King Ndombe, at Wissmann Falls on the Kasai. Of the latter, all were returned to their homes under Ndombe's suzerainty, and were content to stay there where they were comparatively safe.

The story of Ota Benga's first coming to America is as follows:

When our steamer called at the confluence of the Kasai with the Sankuru, where Commandant Loos of the Belgian colonial army was stationed, he told me that there was a strange little man in his settlement, who had been found by his soldiers as a captive slave in the hands of the cannibal Baschilele, when the former had gone on an expedition to stop one of the lat-

ter's periodic forays, into the interior. The Baschilele nearly always ate their captives, and therefore Ota Benga was released just in time to save his life.

He came back to the settlement with his deliverers, and lived there. His language was entirely different from that of the soldiers and of the Baschilele, and very little could be learned from him about his tribe. After I arrived, being an old-timer in knowing the pygmies at Ndombe, I managed to find out from him some facts which subsequently were enlarged upon when Ota Benga learned to speak a little English.

It appeared that his tribe was known as the Badi, in contrast to the pygmies at Ndombe, who were of the Batwa tribe. His language differed from theirs to a considerable extent, though there is a good deal in common. All the members of his tribe, like himself, were undersized, and had the other characteristics of the pygmies, who in reality are widely scattered through the Congo valley.

When I asked him if he would like to go to America with me, he said he would stay with me while I was in the Kasai country, and see how he liked it, provided I would agree to let him remain behind, should he so decide before we were due to leave. On these conditions he went with me farther up the river to Wissmann Falls, where the Batwa lived in Ndombe's country.

When the palavers about the group going to St. Louis were being held, Ota Benga took up the side for going, and it was largely because he was personally of a brave and a strong temperament that he took that side. His influence had much to do with the final decision of the others to take the trip, which, be it remembered, was an unqualified success from start to finish. Within a year's time the whole party returned, with Ota Benga included, in safety to Ndombe.

When we got back to Ndombe, I offered to leave Ota Benga there in Ndombe's care, or let him stay at the Belgian station below; but he did not wish to stay at either place, nor at a mission. His own country was remote from any of these places, and his people were in a state of war with the Baschilele, who were between them and the white settlements that were situated among the friendly Bakuba and Baluba tribes. Ota said he wanted to go back to America; and with some misgivings, I permitted him to come.

I did not think that Ota ever would acquire an education in the conventional sense of the word, but I believed that I would be making

\*As noted in the BULLETIN for May, 1916, Ota Benga committed suicide at Lynchburg, Va., last April. His height was four feet, eleven inches; his weight was 103 pounds, and when he was at the Zoological Park, in 1906, he was twenty-three years of age.



AFRICAN PYGMY, OTA BENGA AND CHIMPANZEE  
From a photograph made in 1906 in the Zoological Park, New York City

other trips to Africa, as I had in hand certain discoveries of mineral and other resources that I felt sure would attract attention, so that he could go back again if he wished.

Ota's experience in New York is well known. It resulted first in a sensational story about putting him in a monkey-cage as an exhibit, and later on in an effort to give him an education. The Zoological Park simply gave him temporary employment in feeding the anthropoid apes, and a safe and comfortable home for a short time, while I was engaged in private affairs which needed my attention after these years of absence in Africa.

After Ota started on his school course, he became interested in it and so attached to his friends in the work, that when I offered him a chance to return to Africa with me on my next expedition he would not go. Later on I offered him an opportunity to work here on the Panama Canal, but he still stood firm on his first position.

I never thoroughly understood his mental attitude, but he was one of the most determined little fellows that ever breathed. Possibly he was trying to prove all the time that he was not a pygmy, as that term, even in Africa, always conveys the idea of difference from and inferiority to other people. I never addressed him as one. To me he was very human; a brave, shrewd, even smart little man, who preferred to match himself against civilization than to be a slave to the Baschilele. All honor to him, even though he died in the attempt!

His manner of going was an apparent confession of defeat; but Hannibal and Marc Antony were big souls that succumbed in the same way after they saw that they had undertaken the impossible. I wish I had been near Ota Benga, with an opportunity to try to cheer up his spirit; but doubtless his friends there did all they could. He left Africa because he would not be a slave, and he preferred to die in America rather than endure a confinement against which his spirit rebelled. The chains of civilization still were chains to him.

I never believed that the sort of education which seems to be the standard to-day was suited to him; nor did I encourage that educational experiment. At the same time I was not willing to combat his chance along that line, especially since his other friends sincerely believed it wise. Even had he gone back to Africa, he might have fared no better. His country is now torn by war made by the white men among themselves, and a war far more terrible than any the pygmies ever waged. In fact, I have lately heard that Ndombe's peaceful kingdom

was utterly broken up by the Belgians just before King Albert came to the throne, and that Ndombe's son was put in prison on some trivial charge.

Between the impossible conditions of Ota Benga's own land, and those which he could not surmount on ours, the homeless pygmy found no abiding-place. Can we wonder that he gave up his life as an unsolvable problem? It was no less a man than Alfred Russell Wallace who wrote me a short time before he died, and before the European war started: "The human race has not made much real progress in five thousand years."

#### STATUS OF THE ALLIGATOR IN 1916.

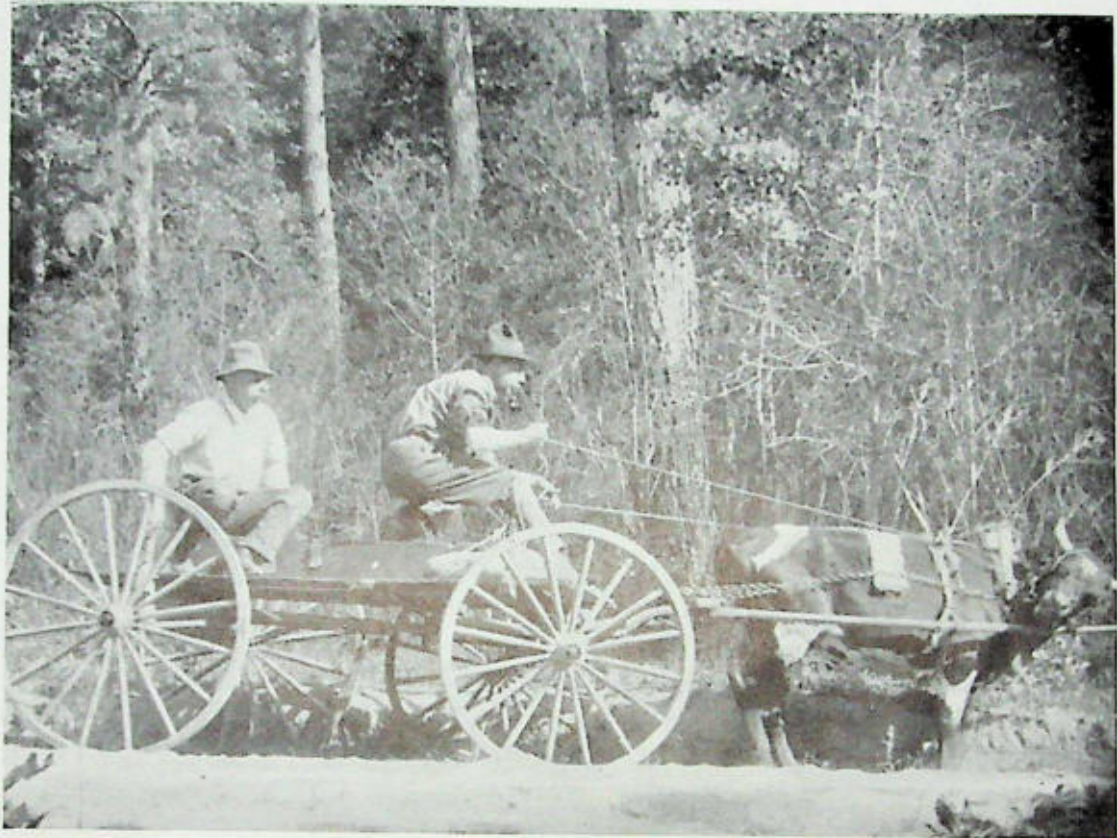
By RAYMOND L. DITMARS.

**D**URING a collecting trip in April and May covering a considerable area of the low-grounds along the Savannah River, the writer had excellent opportunities for studying the present status of the alligator. The observations made are particularly interesting when compared with conditions noted on the same ground fifteen years ago, during which period there has been much alligator hunting, and the crafty reptiles have adopted tactics for self preservation that are foreign to their former habits.

Like many other wild creatures threatened with extinction, the alligator is fighting hard for its life. In its battle for existence it has certain advantages over other animals. Its ability to recover from gun-shot wounds, unless wounded in a vital part, and its habit of remaining close to sheltering, muddy water constitute important factors in self preservation.

Despite the alleged low mentality of reptiles, the alligator appears to have developed a fear of man and of guns equivalent to the sagacity of the modern bear. Throughout the greater part of its former distribution, the big reptile has retreated from the rivers and from exposure to hostile observations from boats, and has taken up its abode in swamps that are remote and little disturbed.

Fifteen years ago the writer spent some weeks collecting reptiles about thirty miles inland from Savannah, in the extensive low grounds on the South Carolina side of the Savannah River. At that time alligators were yet fairly common in the river, and frequently were seen in the big open lakes that connect with the river during freshets. Back in the cypress low-grounds, which are thick, difficult



COLLECTING WAGON

A primitive type of South Carolina conveyance

places to reach and extending about two miles from the stream were occasional alligators, but we noted few indications of their existence. At that time, the river steamboats carried veritable arsenals in immediate readiness on the tops of their pilot houses. The appearance of an alligator caused a general fusillade. Fishermen going into the lakes invariably carried guns for the diversion to be found in shooting at every alligator that appeared. These forms of persecution have driven the reptiles to cover, but have not wholly accomplished their extermination.

During the spring of the present year, the writer and Keeper George Palmer so successfully covered this same area in another collecting trip for turtles, lizards and snakes that it resulted in the capture of over five hundred specimens. We expected to find the alligator almost exterminated, and were not surprised to learn that these reptiles are "pretty scarce" along the Savannah River and larger bodies of open water. During a series of trips into the dense cypress swamps, however, the discovery

was made that alligators are even yet fairly numerous. They had retreated into these protecting swamps, and multiplied in greater numbers than formerly were seen on the river.

The accompanying illustrations convey an impression of the vast area and inaccessibility of these cypress swamps. Their scenery is weird and impressive, and their atmosphere, to human beings, is decidedly unwholesome. They shelter legions of moccasins, and various species of bloodsucking insect pests, some of which burrow under the skin and cause dangerous sores.

On entering the swamp, one is immediately impressed by the spectacle of great trees that swell at the base like the neck of a bottle, and sometimes are so boldly corrugated as to appear like a compressed mass of organ pipes. Many of these trees are a hundred feet high, and some are much higher, and their foliage is fine and feathery, like that of the northern larch.

In some areas not a ray of sunlight strikes the ground, although there is a peculiar, and really bright effect of lighting that is due to



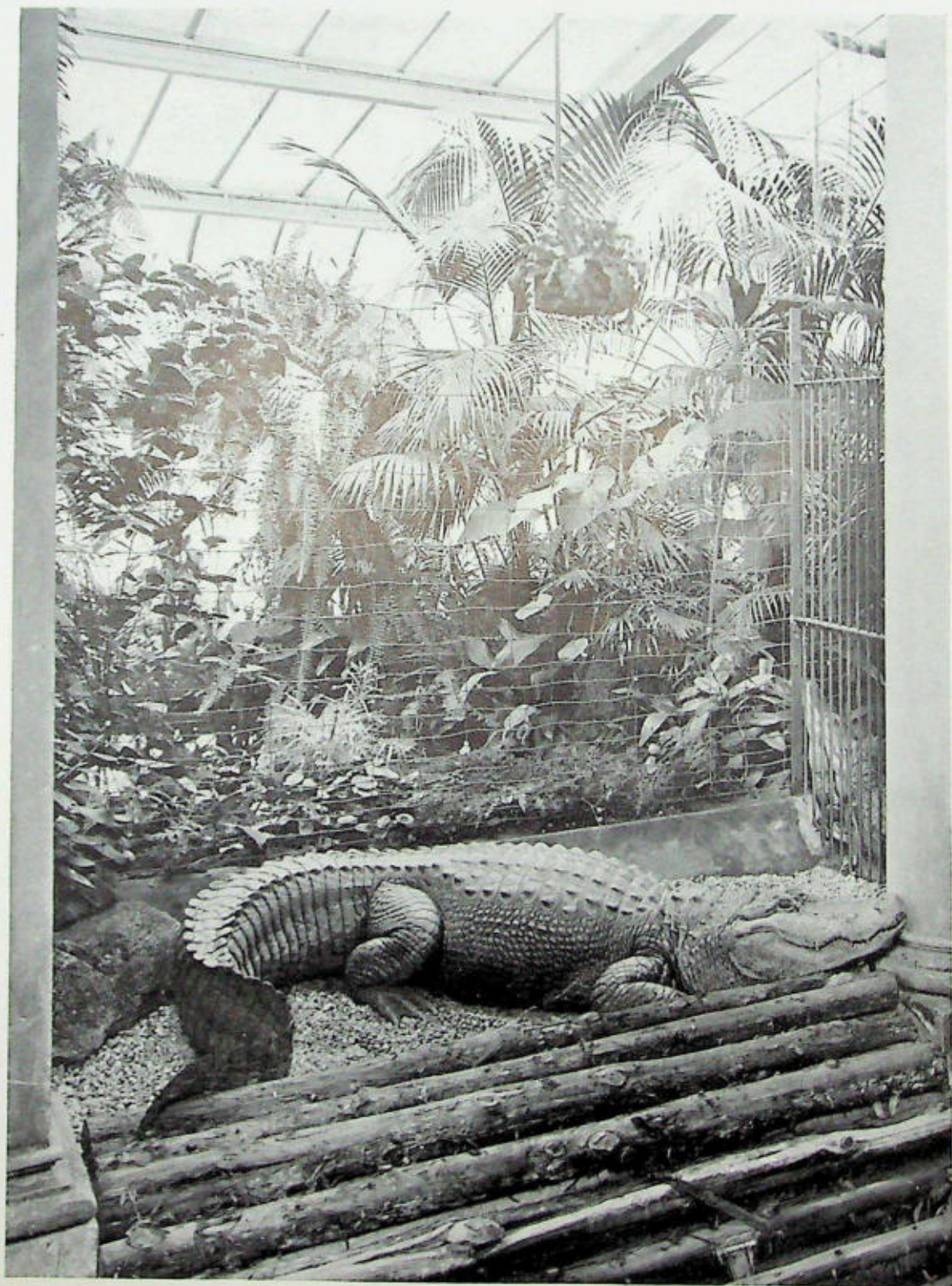
HUNTING FOR LIZARDS

In the cool of the early morning these active creatures hide under the bark

reflections from the mud-encrusted tree trunks and cypress knees. The great river backs into these swamps during freshets, and stains the trunks from six to ten feet high to the color of its coffee-colored waters. This dries out to a pinkish-brown color, and imparts an effect like a weird stage setting for an allegorical opera.

In these swamps the crafty adult 'gator selects a pool, then burrows under the bank until it has constructed a deep, under-water cavern in which to retreat. The pools teem with fish of various kinds, and some of these are of large size. In nesting time, July and August, the female crocodilian selects a particularly secluded spot, then scrapes together a great mound of dead twigs, leaves and mud. The mound is from six to ten feet in diameter, and from three to four feet deep. In this nest the parent buries her eggs, which have a very hard and brittle shell. Incubation comes from a certain amount of artificial heat generated by the mound of decomposing vegetation; and the young hatch in about eight weeks.

The alligators observed by the writer in the cypress swamps were extremely shy. In making our way toward the pools, it was necessary to go with the utmost care in order to avoid stepping upon brittle twigs, or rustling the leaves of bushes. Their sight is so keen that it is necessary to advance very slowly, using bushes and tree trunks as screens. Coming in this way to a bayou we observed an alligator about eleven feet long sprawled upon the bank, with fore and hind feet stretched in abandon. The mouth was open and the eyes appeared to be shut. Nearby were about a dozen small specimens ranging in length from two to four feet. All were on the opposite side of the pool from where we stood. We had consumed about twenty minutes in our stealthy progress to the pool, over the last three hundred feet, and we crouched behind an enormous cypress trunk smothered in vines. One of the party, sinking in the ooze, threw out an elbow to save himself. On the instant it seemed that every alligator in the bayou had received an electric shock.



*Photo by E. R. S.*

**CONTENTMENT AFTER THE JOURNEY NORTH**

Our captive is slightly over eight feet long



HEART OF THE CYPRESS SWAMP

The modern alligator has retreated into these vast, inaccessible areas

The big specimen went into the water with a crash, sending up a geyser of muddy spray. The rush of the smaller reptiles was practically simultaneous, and it was followed by the appearance of many infant 'gators that had been prowling among the cypress knees. They came from all directions, running like frightened chicks, all seeking the protecting water.

Our experiences in a number of bayous were quite similar. The writer photographed one batch of alligators coming to the surface and crawling out on the bank; but this was done only after constructing a blind for the camera and waiting, motionless, for over an hour. During this time some great blue herons and snowy egrets were much interested, coming within twenty feet of us, with darting of heads and staring of pale yellow eyes. Several 'gators rising near these birds caused a big heron to take flight, and the crash of his wings as he went through the trees sent the reptile colony to the bottom for another long wait.

During one of the bayou excursions we noted an alligator diving into a water hole not more

than six feet in diameter. When we sounded this hole, we found it to be five feet deep, with an under-water tunnel running off at a sharp vertical slope to a distance of twelve feet. Our collecting wagon was not over a mile away, on a corduroy road, and we returned for a steel alligator hook, an axe and coil of rope. A slender young cypress was cut and the hook attached to it.

A half hour's manœvering enabled us to hook the reptile that was located in that underground retreat. It remained motionless until the hook had firmly caught, then so furiously did it struggle that to drag it out was a herculean task. The hook had penetrated a fore-foot, and we brought the animal to the surface for a view of its size, and to determine upon methods for its subjugation.

A noose was made, the creature was again hauled out, when the rope was slipped over the jaws, a loop thrown around and behind the forefeet, and thence over the jaws again. Then we tied the reptile to a cypress tree, and made ready to bind him more securely.



AN ALLIGATOR'S BASKING PLACE

The ripples mark the place where a big specimen has just dived into the water.

The struggles of the reptile were fast and vigorous. We worked on a platform of bark hastily torn from a decaying tree, and which prevented our sinking to our knees in the swamp. Between showers of mud thrown up by the alligator's tail, we looped the creature's jaws in a way to form a rope muzzle with about ten feet attached for pulling.

We hauled him a full quarter-mile out of the thicker part of the swamp, thence led the wagon a tortuous route between the trees to meet the captive. Lifting the animal to the wagon, we bound him to the floor upon paddings of Spanish moss, then drove ten miles over corduroy roads to the pinelands and our collecting base.

We had rented an empty house as our camp, and having no cage for the alligator, were in doubt what to do with him until morning, when a shipping crate could be built. Our troublesome specimen was eight feet long and about two hundred pounds in weight. Threatening to destroy the wagon, and hissing furiously he caused us some anxiety, until the idea occurred of locking him in our best bedroom. With

much prudence we moved out furniture and baggage, before the alligator went in. His initial struggles with his new surroundings shook the house, and a blow of his head loosened the door fastenings. But in the end the room held him, and the next morning a crate was built for shipment to the North.

This fine specimen is now on exhibition in the Reptile House, and in the large pool with a specimen almost matching him in size that hatched from a batch of eggs collected in the same neighborhood fifteen years ago.

Fortunately, for the future status of the alligator, the market for hides has reached such a low ebb that traffic in skins is no longer worth while. A large dealer in leather goods informed the writer that the skin of a four foot reptile—the size most preferable in "the trade"—is worth but fifty cents, and that the finest dressed hide, all ready for cutting into desirable sizes for manufactured articles, is worth only two dollars. This latter value involves tanning only by the best processes. As a fashion, the use of alligator hide has "gone out."



TEXAS WHITE-TAILED DEER  
Sixteen Point Buck

### BIG GAME OF THE TEXAS BORDER.

By CHAPMAN GRANT.\*

TWO four-point antlers hung on a back porch in Texas; tied together by a two-foot cord; their bases smoothed off and polished, evidently used as handles. Nothing to excite interest, but I wondered what purpose they could serve. Upon inquiring I was told in a matter-of-fact way that they were used for "rattling up deer." "You climb into a mesquite, early of a frosty morning, rattle the horns and bucks will run up to you." "You can shoot them if there are no rangers around."

This is quite enough. I laughed indulgently to show that I could not be gulled into "holding the sack," for any Texas version of our classical "snipe hunts." A wily buck running up to watch a gentleman in a tree rattling the antlers of one of his, the buck's, deceased relatives was too wild a fancy to fool any one.

However, hunting deer by "rattling" is a recognized offence in Texas, and forbidden by

\*The observations in "Big Game of the Texas Border" were made by the author during a two-years' service as 2nd Lieutenant of the Fourteenth U. S. Cavalry in the border patrol. Mr. Grant is now on the reserve list for 1st Lieutenant, of Cavalry, U. S. Volunteers.—EDITOR.

the game laws. Buck deer begin to fight when cold weather sets in, which is about the second half of November or the first part of December. The poacher secures two antlers and climbs into a mesquite tree so that he can get a fair view around him. Then, with his rifle in a convenient place, he takes an antler in either hand and brings them together with a crash, rattling the points and drawing them apart. On a clear, cold morning this noise can be heard a long distance. The rattling is repeated several times, but the technique varies with each hunter. Each claims more or less exclusive knowledge of just how it should be done, based generally on his remembrance of the sounds of conflicts between bucks that he has witnessed. They all admit that old, dry antlers do not emit the proper sound.

Large bucks are the first to respond. Occasionally they may be seen a quarter of a mile away, coming at a gallop. Sometimes from ten to fifteen bucks can be assembled in half an hour, the smaller ones coming more stealthily, and the does very rarely or not at all. The unscrupulous hide-hunter used to slaughter many deer in this way where game was abundant. One might imagine this a prosaic way to hunt, but all who have tried it agree that it is most thrilling.



SWOLLEN NECK OF BUCK  
This occurs during the rut

The first time I saw a doe running with one fore leg held up in front of her, I thought that she had been wounded, especially since she ran this way until out of sight. Later I saw a doe and two fawns feeding, and approached within a few yards, up-wind. Finally the doe saw me move, and gave one of their peculiar, whistling snorts that can be heard a very long distance. I stood motionless and she regarded me for several minutes, but seeing no further movement, was undecided whether to start feeding again or not. I moved again, and she turned and trotted off, holding one fore foot high in air for several steps and then bringing it down smartly with an impact that I could plainly hear. She snorted several more times while running away, and struck at intervals with one and then the other fore foot. The fawns were striking the ground also, and all three disappeared over the hill with white tails waving from side to side, every hair erect. It was a noisy and conspicuous cavalcade. I have seen this time and again. When a bunch of deer is started, the smaller fawns are often left behind, or else remain out of curiosity. It may be that they have so recently lost their baby spots that they are undecided whether to run or freeze.

The food of the white-tail consists for the most part of small, black-thorn twigs which are nipped off and swallowed, thorns and all. Later they are chewed fine in the cud. The common opuntia, or prickly pear, also is a favorite with them. It is at first difficult to distinguish between the sound made by a steer breaking "pear" and that made by a deer. Cactus is a nourishing food, and during dry years, ranchmen send Mexicans over the range with gasoline torches to burn the thorns off of the pear. Cattle and goats follow after the torch, finding food and drink in the succulent leaves. Eating unburned pear year after year generally kills cattle, because abscesses form on their jaws. Deer do not seem to suffer in this way. Deer, wild cats, peccaries and rabbits all have a coating of thorns, large and small, immediately beneath their skins, resembling a coating of felt with a generous interspersion of mesquite thorns. I believe that these thorns remain in the animal throughout life, as they lie in the connective tissue immediately beneath the skin, and do not cause inflammation. Besides, the older the animal the more thorns he seems to have.

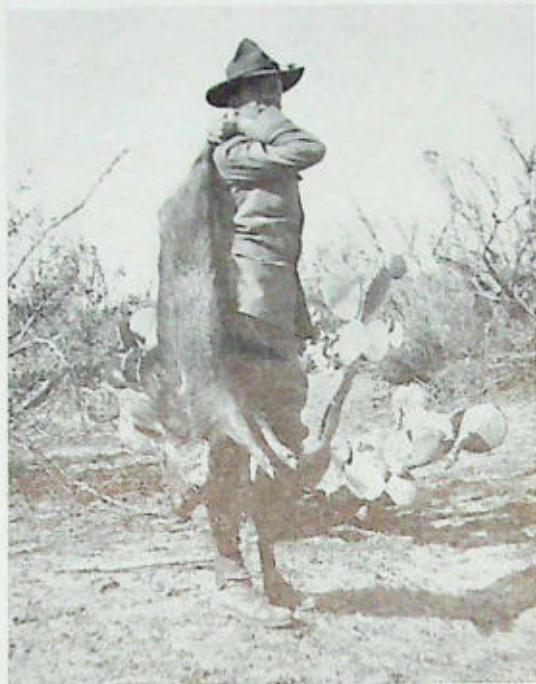
Mexicans make seccinas of deer meat, known in the west as "jerkey." The meat is split into thin sheets, sparingly salted and peppered, piled and allowed to drain for a few hours, and then hung in the shade. The hanging portions

are propped apart with small twigs so that the air can circulate freely. Blowflies do not bother the meat, but wasps eat their fill until it hardens; which in the dry season does not take long. In rainy weather the meat must be hung in the windiest place available. The seccinas are either stored dry or, better yet, are toasted over coals till brown, when they will keep indefinitely. Toasted venison is a delicious and sustaining food, and can be eaten like stick candy, without further preparation. Pinole in Texas is not simply ground, popped popcorn as it is in the west, but is made of equal parts of toasted and ground seccinas, ground and parched corn and brown sugar. This makes a remarkably sustaining and delicious food.

White-tail deer seem to get along amicably with their small neighbor, the collared peccary or "jabaline" (pronounced hav-a-le-ñe), as I have seen eight or ten deer feeding among a bunch of, possibly, twenty peccaries in thorn brush. There are many stories current of the ferocity of these little pigs. Many hunters claim that they are dangerous, and attack when wounded or to protect their young. Close inquiries failed to elicit any authentic information of anyone actually being hurt by them, but numerous stories prevailed of hunters being treed by infuriated peccaries. Judging by the rapidity with which these little pigs can travel through the brush, I believe it would be very difficult for an active man to climb a tree, even were one right at hand, before being overtaken. I have shot peccaries, and had a bunch of from five to fifteen scurry past me under the brush in open formation. Those that passed nearby would see me, and snap their tusks and raise their manes, and I believe that this helter-skelter scurry for safety is often mistaken for a charge when really the little pigs are merely running in the direction in which they were headed when startled. I am positive that I could not successfully have escaped by climbing a tree had they really been after me.

The flesh of a young sow is delicious food, but that of the older animals, or the boars, is very musky and not fit for food. The musk-sac must be removed from the animal as soon as it is killed, if the flesh is to be used.

Both sexes bear a scent-gland, analogous to the oil sac of birds, on the pelvis, about eight inches above where the tail should be. The gland lies just below the skin and is not directly attached to the body. It is about two inches in diameter and half an inch thick. The musk is very strong and similar to that of the skunk. I believe the scent is used as a warning to pursuers, and also to enable the young to



COLLARED PECCARY

find the mother. One moonlight night I walked into a herd of sleeping peccaries which started up with grunts, snorts and a clicking of tusks. A wave of musk of great intensity arose and spread so quickly that I feel sure that it literally must have been forcibly ejected from the glands. Habitually, the boars rub their backs on low limbs to leave their trade mark behind and thus mark out their range.

Young peccaries arrive at any season of the year, so that at any time one is likely to come upon a nest containing one or two little reddish pigs. If taken and raised on a bottle they become affectionate pets, and later develop into very jealous and ferocious watch dogs; but for the safety of strangers they must be killed or confined when a couple of years old.

Little black pigs follow their mothers right among the full-grown pigs of both sexes. Pigs may be found anywhere; on hill tops, along streams, on the flats, any place at any time; their little tracks making lacework over the ground after a rain, showing in many places where the pigs walk on the extreme tip of the hoof when expecting danger. The first intimation that one gets of the proximity of pigs is their strong odor, by which they actually can be followed by man.

When the pigs detect the presence of an enemy, they snort and elick their razor-edged tusks, but as soon as the enemy is located they make off, deploying in fan-shape formation, to come together again when danger is past. They root for their food, which seems to be principally vegetable, although grubs also undoubtedly are eaten. Cactus, or nopal, forms a considerable portion of their diet, as it does of the deer, wood rats and other animals.

The peccaries of the Texas border were nearly exterminated some years ago by hide hunters who used dogs. I found a little negro who killed his peccaries with a penknife! The dog would seize the pig by one ear and hold on until our hero ran up, seized piggy by the other ear and cut his throat. Peccaries cannot be hunted with a jacklight, as deer are *illegally* hunted, because their eyes do not shine. Their eyes are small, and possibly the pigs have more sense than to stare at a strange light. It will not be long before peccaries are exterminated throughout the partially settled country, because they are easily followed by dogs, and they have a fatal failing for going over their old range despite the changes wrought by man. Thus it is not unusual to see a band passing through a yard, or even a camp of soldiers.



A MEXICAN AND HIS PET DEER



AN IMMATURE WOOD IBIS  
He might have been saved

#### ITEMS OF INTEREST.

*Avian Castaways.*—Gulls, petrels, gannets and other sea birds are a refreshing sight at sea to break the monotony of the otherwise barren air. Perfectly at home on the water or flying, they derive their food and drink from the sea. Land birds blown to sea at night during migration and alighting upon a steamer for succor from the waste of water give rise to entirely different emotions. The bewildered birds forget their fear of man as a rule, and will suffer themselves to be closely approached. Little warblers flit about the decks and rigging seeking insects that have been blown to sea by the same wind that took them out of their course.

Their fate is generally the same, however; a few sips of salt water that remains in puddles after the sailors have washed down the decks cause their wings to droop, they become less active, and either fall an easy prey to the ship's cat, or crumple up into pitiful little puffs of feathers and die. Larger birds, such as hawks, generally alight upon the wireless antennae and will ride sometimes for two days until their keen eyes detect land.

The only bird that I have noticed show any hesitancy about alighting was a barn swallow. Again I saw a bat far at sea. He paid no attention to the ship, but bore straight on, hopelessly unorientated. Among the birds that I

have seen aboard coastwise vessels are the kingfisher, robin, redstart, yellowthroat, great blue heron, purple martin, mourning dove, osprey and various hawks.

The little castaways appeal to me as peculiarly pathetic, and I always place fresh water where they can get it; but it is doubtful if they are ever saved to find their way ashore. The immature wood ibis in the accompanying cut might have been saved, as we came within sight of land the day following his advent, but he was very guileless and besides the sailors enjoy stewed "crane."—C. G.

*Collecting Reptiles.*—The Curator of Reptiles has returned from a trip to the low grounds bordering the Savannah River, Georgia, spending fourteen days in collecting work. Five hundred and sixty reptiles were caught, crated and successfully shipped to New York without losses of any kind. Turtles, tortoises, lizards, snakes and batrachians were represented in the shipment, to the number of forty-seven species, and the total net weight of the specimens collected was slightly over five hundred pounds. There was a particular necessity for this trip, owing to the fact that our supply of Old World reptiles stopped absolutely, at the beginning of the war. In addition to the specimens that were obtained, the southern trip also yielded photographs and scientific observations.



A TINY CASTAWAY  
A little warbler far out at sea



A BASHFUL ORANG

*A Bashful Orang-Utan.*—Young orang-utans are usually bold and confiding, and delight to be carried about by anyone who takes an interest in them. We have an exception to the rule, however, and this is Datu. He was born in the spring of 1912, and while playful enough in his roomy cage, where he impishly delights in teasing his immediate chums—another young orang and a chimpanzee—he steadily refuses to make friends among the keepers. Keeper Engeholm is the only member of the Monkey House staff who can handle Datu without employing vigorous measures. If Engeholm for a moment leaves the ape while the latter is out for exercise, he manifests his rage with the most fearsome screeches.

Datu is particularly bashful in the presence of the camera. When the instrument is made ready, there is a furtive search for friendly objects to serve as hiding places. The two photographs here shown portray Mr. Sanborn's difficulties. In the first instance Datu refused to be photographed on the table and retired beneath it. After many attempts he was induced to remain on the table, but only when a stool was provided as a canopy of partial seclusion.

*New Anthropoids.*—Despite the fact that the serious war conditions have practically eliminated the foreign animal-market, we have managed to obtain another specimen of chimpanzee which adds strength of numbers to our series of anthropoid apes. There now are three chimpanzees, representing two species, and one orang-utan. The newest arrival among the anthropoids is a female about three years old, of the white-faced type known as *Pan chimpanzee*, and was captured near the Gaboon Coast. Our other chimpanzees are not tractable, and can not be handled. The newcomer,

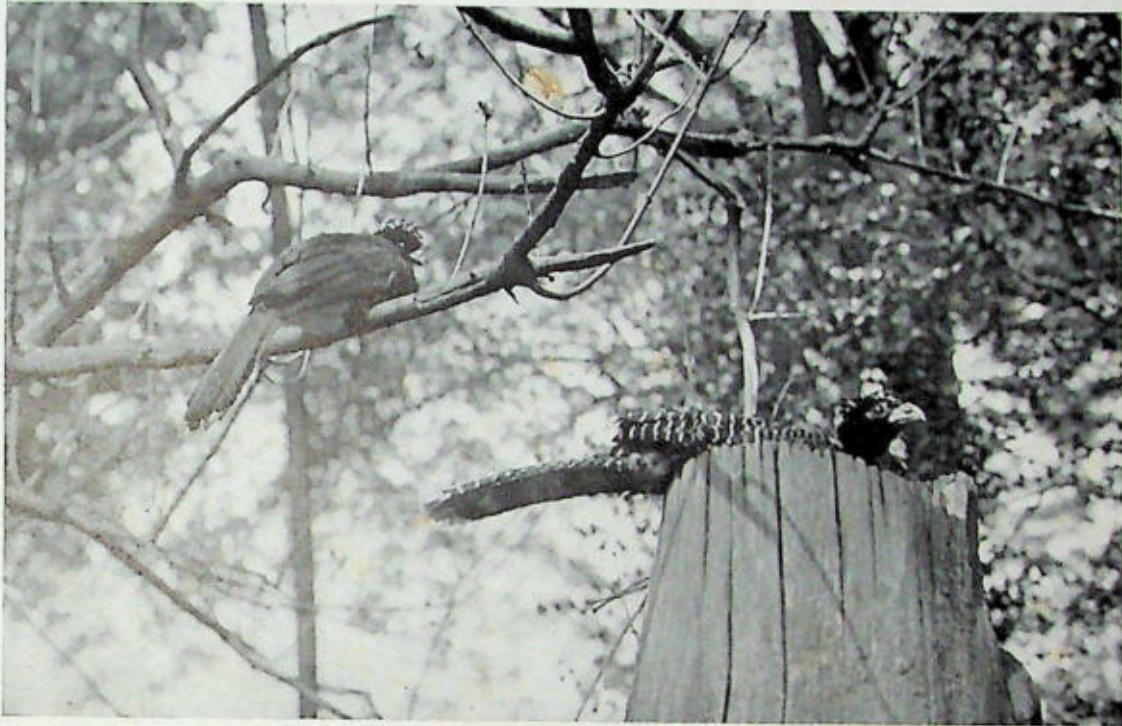
which we call "Fanny," is particularly welcome, as she is altogether docile and delights to be carried about by her keeper.

*Mammal House Repairs.*—Owing to the generous amount of water and disinfectants necessarily used in the cleaning of collections like those of the Small-Mammal House, the cages of that building have become so disintegrated by rusting, that it has become necessary to replace them. The new compartments have been designed particularly to eliminate grooves and channels where water could accumulate. Few of our visitors realize the great amount of labor involved in cleaning the cages of this building. Without this work, the musky odors produced by a collection of civets, mustelines, small canines, felines and various other animals would render the building unpleasant for visitors. There are over one hundred and twenty cages in this building, and each of these must be scrubbed and scoured every morning before visitors enter. To further purify the air we have an electric ozonating apparatus in operation during the day.

*Cementing the Wild-Fowl Pond.*—In conjunction with the repair work in the Small-Mammal House, is the installing of a cement bottom in the Wild-Fowl Pond. Occasional sickness among the water-birds has demonstrated the necessity of treating the pond so that it can be emptied, and the bottom washed, at regular periods. This improvement effects a series of small-mammal cages on the westerly shore. With the water out of the pond, the cages for coypu rats and otters are receiving their share of attention, and an interesting installation will mark the filling of the pond and return of the ducks, geese and other water-fowl from their temporary quarters.



HE WAS INDUCED TO REMAIN ON THE TABLE ONLY WHEN SHELTERED BY THE STOOL



BANDED CURASSOW NESTING IN THE ZOOLOGICAL PARK

There is no authentic record of these birds breeding in captivity, prior to this instance.

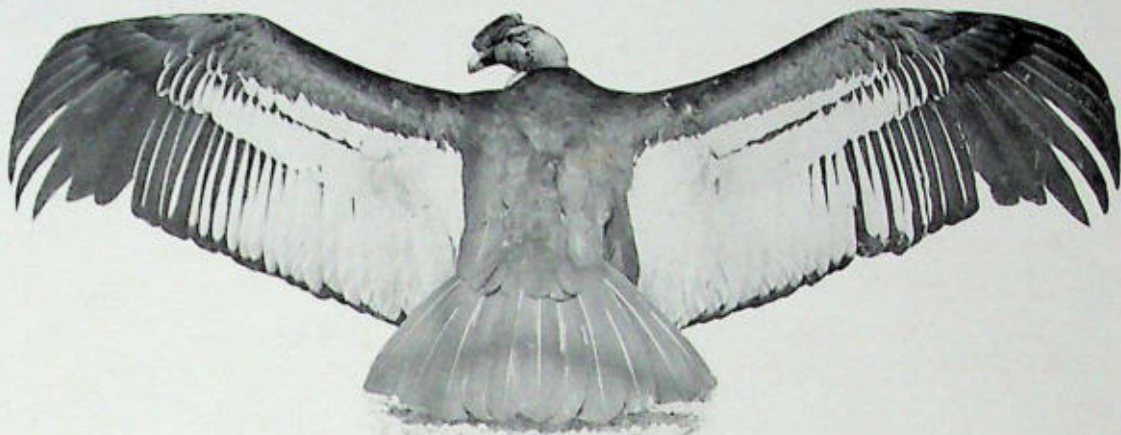
*Shipping Deer.*—We suggest to those interested in the purchase of deer, and who frequently write the Park about duplicate specimens for disposal, that spring is a very bad time for shipments. The bucks are growing their new antlers and being "in velvet" at this time, they are easily injured. It is almost impossible to crate and ship a buck with velvet antlers without the latter becoming cut or bruised with the consequent loss of much blood. Moreover, the does give birth to fawns during May and June, which renders their shipment practically impossible during those months. If deer are to be shipped in the spring, it should be not later than March. In every way the autumn is the preferable time for shipping.—R. L. D.

*Vulture Habits.*—Playfulness and evident pleasure in human society are traits which one would hardly expect to find in birds of the habits of vultures. Yet many of the New World species possess these characters to a marked degree, as has already been noted in the BULLETIN, in the case of the California condor. The king vulture is equally well endowed, and but for a single drawback, the friendly demeanor and brilliant coloration of an adult, hand-reared bird, would make it a charming pet. Its dietary

needs are not difficult to meet, but its unfortunate habit of returning a meal, some time after ingestion, if it is sufficiently displeased, is not a recommendation to close companionship. Seriously, however, the friendliness of really tame king vultures is most engaging as well as interesting, and brings these birds many favors and attentions which otherwise they might not receive.

*Savage Hawks.*—Fortunately for our small birds, the American goshawk is less abundant than its fellow-marauders, the sharp-shin and the Cooper hawk, and except on rare occasions, confines its depredations to the northern portions of the continent. Cannibalism is not the only trait shared by these three villains, for all are difficult to keep in captivity. They are wild and intractable, characteristics markedly different from those of most hawks in confinement. Moreover, they demand a continual diet of birds, which are not always easily supplied.

With the goshawk, our experience has been somewhat limited, as the species is seldom to be obtained. In December, 1915, however, we acquired a superb specimen, which had been captured at Watertown, New York. This bird is becoming very steady, and as it does not insist that all of its food shall be feathered, may prove to be the happy exception.—L. S. C.



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YOUNG HOATZIN

Unlike all other living birds, the young Hoatzin uses his fingers and claws in climbing.

# ZOOLOGICAL SOCIETY BULLETIN

*Published by the New York Zoological Society*

VOL. XIX

SEPTEMBER, 1916

NUMBER 5

## NESTLING HOATZINS AT HOME

*By* WILLIAM BEEBE.

*Illustrated by the Author and Paul G. Howes.*

THE flight of the hoatzin resembles that of an over-fed hen. The hoatzin's voice is no more melodious than the cry of a peacock, but less sonorous than an alligator's roar. The bird's grace is batrachian rather than avian, while the odor of its body resembles that of no bird untouched by dissolution. Still, zoologically considered, the hoatzin is probably the most remarkable and interesting bird living on the earth today.

It has successfully defied time and space. For it, the dial of the ages has moved more slowly than for the rest of organic life, and although living and breathing with us today, yet its world is an affair of two dimensions—a line of thorny saplings threaded along the muddy banks of a few tropical waters.

A bird in a cage cannot escape, and may be found month after month wherever the cage is placed. A stuffed bird in a case may resist dissolution for a century. But when we go to look for the bluebirds which nest in the orchard, they may have flown a half mile away in their search for food. The plover which scurries before us today on the beach may tonight be far away on the first lap of his seven thousand mile flight to the southward.

The hoatzin's status lies rather with the caged bird. In November in New York City an Englishman from British Guiana said to me, "Go to the Berbice River, and at the north end of the town of New Amsterdam, in front of Mr. Beckett's house, you will find hoatzins." Six

months later as I drove along a tropical river road I saw three hoatzins perched on a low thorn bush at the river's edge in front of a house. And the river was the Berbice, and the house that of Mr. Beckett.

Thus are the hoatzins independent of space, as all other flying birds know it, and in their classic reptilian affinities,—voice, actions, arms, fingers, habits,—they bring close the dim epochs of past time, and renew for our inspection the youth of bird life on the earth. It is discouraging even to attempt to translate habits fraught with so profound a significance into words, or to make them realistic even with the aid of photographs.

We took a boat opposite Mr. Beckett's house, and paddled slowly with the nearly-flood tide up the Berbice River. It was two o'clock, the hottest time of the day. For three miles we drifted past the chosen haunts of the hoatzins. All were perched in the shade, quiet in the violent heat, squatting prostrate or sleepily preening their plumage. Now and then we saw a bird on her nest, always over the water. If she was sitting on eggs she sat close. If young birds were in the nest she half-crouched, or perched on the rim, so that her body cast a shadow over the young.

The vegetation was not varied. Muckamucka was here and there in the foreground, with an almost solid line of bunduri pimpler or thorn tree (*Drepanocarpus lunatus*). This was the real home of the birds, and this plant forms



HOATZIN ON ITS NEST

the background whenever the hoatzin comes to mind. This growth loves the water, and crowds down so that the rising of the tide, whether fresh or brackish, covers the mud in which it grows, so that it appears to be quite as aquatic as the mangrove which, here and there, creeps out alongside it.

The pimpler bears thorns of the first magnitude, often double, recurved and at such diabolically unexpected places, that like barbed wire, it is impossible to grasp anywhere without drawing blood. Such a *chevaux-de-frisc* would defend a trench against the most courageous regiment. The stems were light grey, greening toward the younger shoots, and the foliage was pleasantly divided into double lines of locust-like leaflets.

The plants were in full flower,—dainty, upright panicles of wisteria-like pea-blossoms, pale violet and white with tiny buds of magenta. A faint, subdued perfume drifted from them through the tangle of branches. The fruit was ripening on many plants, in clusters of green, semi-circular, flat, kidney pods. The low branches stretched gracefully waterwards in long sweeping curves. On these at a fork or at the

crossing of two distinct branches, the hoatzins placed their nests, and with the soft-tissued leaflets they packed their capacious crops and fed their young.

Besides these two plants, which alone may be considered as forming the principal environment, two blooms were conspicuous at this season; a deep-calyxed, round blossom of rich yellow,—an hibiscus, which the Indians called *makoe*, and from the bark of which they made most excellent rope. The other flower was a vine which crept commonly up over the pimpler trees, regardless of water and thorns, and hung out twin blossoms in profusion, pink or pinkish-white, trumpet-shaped, with flaring lips—an *Echites* of some sort.

The mid-day life about this haunt of hoatzins was full of interest. Tody-flycatchers of two species, yellow-breasted and streaked, were the commonest birds, and their little homes, like bits of tide-hung drift, swayed from the tips of the pimpler branches. They dashed to and fro regardless of the heat, and whenever we stopped they came within a foot or two, curiously watching our every motion. Kiskadees hopped along the water's edge in the shade, snatching insects



NEST AND EGGS OF THE HOATZIN  
The nest is invariably placed over the water

and occasionally splashing into the water after small fish. Awkward Guiana green herons, not long out of the nest, crept like shadow silhouettes of birds close to the dark water. High overhead, like flecks of jet against the blue sky, the vultures soared. Green dragonflies whirled here and there, and great blue-black bees fumbled in and out of the hibiscus, yellowed with pollen and too busy to stop a second in their day-long labor.

This little area held very strange creatures as well, some of which we saw even in our few hours' search. Four-eyed fish skittered over the vultures soared. Green dragonflies whirled quiet, showing only as a pair of bubbly eyes. Still more weird hairy caterpillars wriggled their way through the muddy, brackish current—aquatic larvae of a small moth which I had not seen since I found them in the trenches of Pará.

The only sound at this time of day was a drowsy but penetrating *tr-r-r-r-p!* made by a green-bodied, green-legged grasshopper of good size, whose joy in life seemed to be to lie lengthwise upon a pimply branch, and skreek violently at frequent intervals, giving his wings a frantic flutter at each utterance, and slowly encircling the stem.

In such environment the hoatzin lives and thrives, and, thanks to its strong body odor, has existed from time immemorial in the face of

terrific handicaps. The odor is a strong musky one, not particularly disagreeable. I searched my memory at every whiff for something of which it vividly reminded me, and at last the recollection came to me—the smell, delectable and fearfully exciting in former years—of elephants at a circus, and not altogether elephants either, but a compound of one-sixth sawdust, another part peanuts, another of strange animals and three-sixths swaying elephant. That, to my mind, exactly describes the odor of hoatzin as I sensed it among these alien surroundings.

As I have mentioned, the nest of the hoatzin was invariably built over the water, and we shall later discover the reason for this. The nests were sometimes only four feet above high water, or equally rarely, at a height of forty to fifty feet. From six to fifteen feet included the zone of four-fifths of the nests of these birds. They varied much in solidity, some being frail and loosely put together, the dry, dead sticks which composed them dropping apart almost at a touch. Usually they were as well knitted as a heron's, and in about half the cases consisted of a recent nest built upon the foundations of an old one. There was hardly any cavity at the top, and the coarse network of sticks looked like a precarious resting place for eggs and an exceedingly uncomfortable one for young birds.



FLEDGLING HOATZINS  
One has already dived into the water



When we approached a nest, the occupant paid no attention until we actually came close to a branch, or shook it. She then rose, protesting hoarsely, and lifting wings and tail as she croaked. At the last moment, often when only a yard away, she flew off and away to a distance of fifty feet or more. Watching closely, when she realized that we really had intentions on her nest, she returned and perched fifteen or twenty feet away, croaking continually, her mate a few feet farther off, and all the hoatzins within sight or hearing joining in sympathetic disharmony, all with synchronous lifting of tail and wings at each utterance.

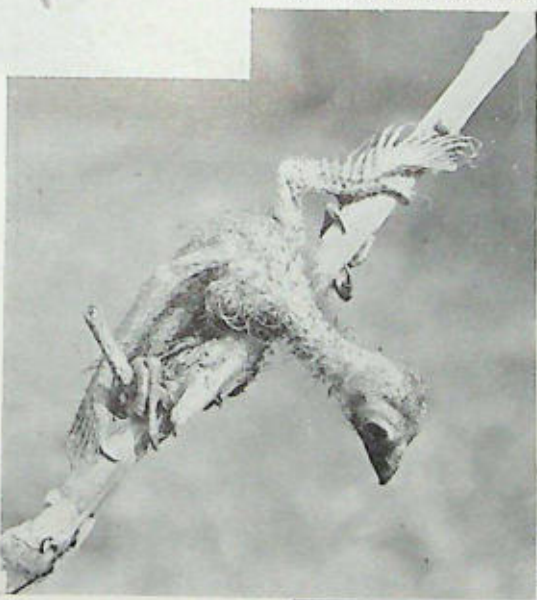
The voice of the female is appreciably deeper than that of the male, having more of a gurgling character, like one of the notes of a curassow. The usual note of both sexes is an unwritable, hoarse, creaking sound, quite cicada or frog-like.

Their tameness was astounding, and they would often sit unmoved, while we were walk-

ing noisily about, or focusing the camera within two yards. If several were sitting on a branch and one was shot, the others would often show no symptoms of concern or alarm, either at the noise of the gun or the fall of their companion. A hoatzin which may have been crouched close to the slain bird would continue to preen its plumage without a glance downward. When the young had attained their first full plumage it was almost impossible to distinguish them from the older members of the flock except by their generally smaller size.

But the heart of our interest in the hoatzins centered in the nestlings. Some kind Providence directed the time of our visit, which I chose against the advice of some of the very inhabitants of New Amsterdam. It turned out that we were on the scene exactly at the right time.

A week either way would have yielded much poorer results. The nestlings in seven occupied nests, observed as we drifted along shore, or landed and climbed among the thorns, were in an almost identical stage of development. In fact, the greatest difference in size occurred between two nestlings of the same brood. Their down was a thin, scanty, wizzy covering, and



#### NESTLING HOATZINS

Climbing with neck, fingers and toes.

the flight feathers were less than a half-inch in length. No age would have showed to better advantage every movement of wings or head.

When a mother hoatzin took reluctant flight from her nest, the young bird at once stood upright and looked curiously in every direction. No slacker he, crouching flat or awaiting his mother's directing cries. From the moment he was left alone he began to depend upon the warnings and signs which his great beady eyes and skinny ears conveyed to him. Hawks and vultures had swept low over his nest and mother unheeded. Coolies in their boats had paddled underneath with no more than a glance upward. Throughout his week of life, as through his parents' and their parents' parents' lives, no danger had disturbed their peaceful existence. Only for a sudden wind storm such as that which the week before had upset nests and blown out eggs, it might be said that for the little hoatzin chicks life held nothing but siestas and munchings of pimpler leaves.

But one little hoatzin, if he had any thoughts such as these, failed to count on the invariable exceptions to every rule, for this day the totally unexpected happened. Fate, in the shape of enthusiastic scientists, descended upon him. He was not for a second nonplussed. If we had concentrated upon him a thousand strong, by boats and by land, he would have fought the good fight for freedom and life as calmly as he waged it against us. And we found him no mean antagonist, and far from reptilian in his ability to meet new and unforeseen conditions.

His mother, who a moment before had been packing his capacious little crop with predigested pimpler leaves, had now flown off to an adjoining group of mangroves, where she and his father croaked to him hoarse encouragement. His flight feathers hardly reached beyond his finger tips, and his body was covered with a sparse coating of sooty black down. So there could be no resort to flight. He must defend himself, bound to earth like his assailants.

Hardly had his mother left when his comical head, with thick, blunt beak and large intelligent eyes appeared over the rim of the nest. His alert expression was increased by the suspicion of a crest on his crown where the down was slightly longer. Higher and higher rose his head, supported on a neck of extraordinary length and thinness. No more than this was needed to mark his absurd resemblance to some strange, extinct reptile. A young dinosaur must have looked much like this, while for all that

my glance revealed, I might have been looking at a diminutive Galapagos tortoise. Indeed this simile came to mind often when I became more intimate with nestling hoatzins.

Sam, my black tree-climber, kicked off his shoes and began creeping along the horizontal limbs of the pimplers. At every step he felt carefully with a calloused sole in order to avoid the longer of the cruel thorns, and punctuated every yard with some gasp of pain or muttered personal prayer, "Pleas' doan' stick me, Thorns!"

At last his hand touched the branch, and it shook slightly. The young bird stretched his mittened hands high above his head and waved them a moment. With similar intent a boxer or wrestler flexes his muscles and bends his body. One or two uncertain, forward steps brought the bird to the edge of the nest at the base of a small branch. There he stood, and raising one wing leaned heavily against the stem, bracing himself. My man climbed higher and the nest swayed violently.

Now the brave little hoatzin reached up to some tiny side twigs and aided by the projecting ends of dead sticks from the nest, he climbed with facility, his thumbs and forefingers apparently being of more aid than his feet. It was fascinating to see him ascend, stopping now and then to crane his head and neck far out, turtle-wise. He met every difficulty with some new contortion of body or limbs, often with so quick or so subtle a shifting as to escape my scrutiny. The branch ended in a tiny crotch and here perforce, ended his attempt at escape by climbing. He stood on the swaying twig, one wing clutched tight, and braced himself with both feet.

Nearer and nearer crept Sam. Not a quiver on the part of the little hoatzin. We did not know it, but inside that ridiculous head there was definite decision as to a deadline. He watched the approach of this great, strange creature—this Danger, this thing so wholly new and foreign to his experience, and doubtless to all the generations of his forebears. A black hand grasped the thorny branch six feet from his perch, and like a flash he played his next trick—the only remaining one he knew, one that set him apart from all modern land birds as the frog is set apart from the swallow.

The young hoatzin stood erect for an instant, and then both wings of the little bird were stretched straight back, not folded, bird-wise, but dangling loosely and reaching well beyond



BANKS OF THE BERBICE RIVER  
Home of the Hoatzin

the body. For a considerable fraction of time he leaned forward. Then without effort, without apparent leap or jump he dived straight downward, as beautifully as a seal, direct as a plummet and very swiftly. There was a scarcely-noticeable splash, and as I gazed with real awe, I watched the widening ripples which undulated over the muddy water—the only trace of the whereabouts of the young bird.

It seemed as if no one, whether ornithologist, evolutionist, poet or philosopher could fail to be profoundly impressed at the sight we had seen. Here I was in a very real, a very modern boat, with the honk of motor horns sounding from the river road a few yards away through the bushes, in the shade of this tropical vegetation in the year nineteen hundred and sixteen; and yet the curtain of the past had been lifted and I had been permitted a glimpse of what must have been common in the millions of years ago. It was a tremendous thing, a wonderful thing to have seen, and it seemed to dwarf all the strange sights which had come to me in all other parts of the earth's wilderness. I had read of these habits and had expected them, but like one's first sight of a volcano in eruption, no reading or description prepares one for the actual phenomenon.

I sat silently watching for the re-appearance of the young bird. We tallied five pairs of eyes and yet many minutes passed before I saw the same little head and emaciated neck sticking out of the water alongside a bit of drift rubbish. The only visible thing was the protruding spikes of the bedraggled tail feathers. I worked the boat in toward the bird, half heartedly, for I had made up my mind that this particular brave little bit of atavism deserved his freedom, so splendidly had he fought for it among the pimplers. Soon he ducked forward, dived out of sight and came up twenty feet away among an inextricable tangle of vines. I sent a little cheer of well wishing after him and we salvaged Sam.

Then we shoved out the boat and watched from a distance. Five or six minutes passed and a skinny, crooked, two-fingered mitten of an arm reared upward out of the muddy flood and the nestling, black and glistening, hauled itself out of water.

Thus must the first amphibian have climbed out, shaken the water from its eyes and gasped

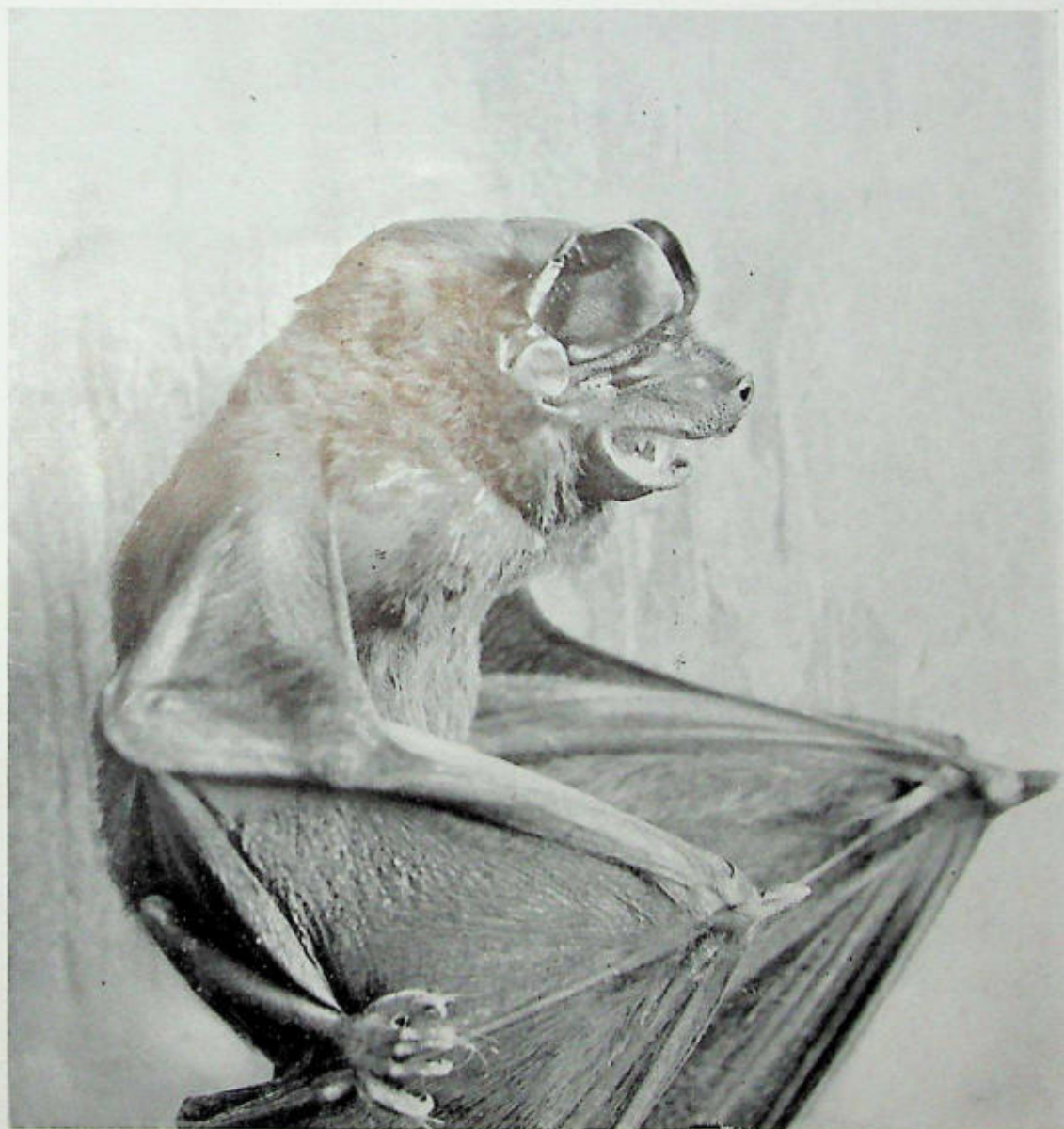
in the thin air. But the young hoatzin neither gasped nor shivered, and seemed as self possessed as if this was a common occurrence in its life. There was not the slightest doubt however, that this was its first introduction to water. Yet it had dived from a height of fifteen feet, about fifty times its own length, as cleanly as a seal leaps from a berg. It was as if a human child should dive *two hundred feet!*

In fifteen minutes more it had climbed high above the water, and with unerring accuracy directly toward its natal bundle of sticks overhead. The mother now came close, and with hoarse rasping notes and frantic heaves of tail and wings lent encouragement. Just before we paddled from sight, when the little fellow had reached his last rung, he partly opened his beak and gave a little falsetto cry,—a clear, high tone, tailing off into a guttural rasp. His splendid courage had broken at last; he had nearly reached the nest and he was aching to put aside all this terrible responsibility, this pitting of his tiny might against such fearful odds. He wanted to be a helpless nestling again, to crouch on the springy bed of twigs with a feather comforter over him and be stuffed at will with delectable pimpler pap. Such is the normal right destiny of a hoatzin chick, and the *wheee-og!* wrung from him by the re-action of safety, seemed to voice all this.

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*Our Gavial.*—One of the rarest specimens on exhibition in the Reptile House is the Indian gavial, which arrived at the Park about five years ago. This curious crocodilian has a much elongated snout like the handle of a frying pan, and the slender jaws generously studded with long and very sharp teeth. The gavial is alleged to be an extremely delicate reptile in captivity, but our specimen has thriven from the date of its arrival, and steadily increased in size. It is now about seven feet long, having increased about two feet in length while in the Park. It is much more agile than alligators and crocodiles and for that reason it is not safe for a keeper to enter its enclosure. By some authorities it is claimed that this species attains the greatest length of any living reptile, thirty-foot specimens having been recorded in its *habitat*, the River Ganges, of northern India, and its tributaries.

SOME INTERESTING PICTURES  
FROM THE TROPICAL RESEARCH STATION  
BRITISH GUIANA



VAMPIRE (*Vampyrus* sp.)

These bats were abundant at Kalacoon, both indoors and out. They drew the blood of our pets and chickens but never molested us even after we ceased burning a night lantern, although we often heard the swish of their wings and felt the air fanned as they brushed our faces.



WHITE-HEADED SAKI OR BEESA MONKEY

*Pithecia pithecia* (Linn.)

These solemn looking jungle folk occasionally peered down at us from the tree-tops of the Guiana forest, usually in family trios. Once I saw them feeding in friendly association with a pack of Red Howlers.



YOUNG BLACK-NECKED ARACARI TOUCAN

*Pteroglossus aracari* (Linn.)

Until now there has been no definite record of the eggs or young of any Toucan, although these birds form an important family of about seventy species. This nestling bird, two weeks old, was, with its brother, taken from a hole fifty feet above the ground in a giant Kakaralli tree.



AN AKAWAI INDIAN BENAB

The mode of life of the Indians about our Guiana station was extremely primitive. The Maenushis who collected for us, used bows and arrows. The Akawais lived simple lives in open bungalows. A hammock, a few pieces of cloth, a bottle, an iron pot or two, dried fish and a cassava field comprised most of their luxuries and necessities.

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**ZOOLOGICAL SOCIETY BULLETIN**


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Published *bi-monthly* at the Office of the Society,  
111 Broadway, New York City.

Yearly by Mail, \$1.00.

MAILED FREE TO MEMBERS.

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ELWIN R. SANBORN,

*Editor and Official Photographer*

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VOL. XIX, No. 5                      SEPTEMBER, 1916

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### THE GREATEST VICTORY FOR THE BIRDS.

With record-breaking celerity the international treaty between Canada and the United States for the federal protection of all the migratory birds of North America, north of Mexico, has been ratified by Congress, and is now a law. It was initiated, over two years ago, by Senator George P. McLean of Connecticut, in a Senate resolution. At that time President Wilson wrote a letter to Secretary Bryan, approving the idea, and requesting its advancement.

After a great amount of labor in Canada, in which Dr. C. Gordon Hewitt, of the Canadian Department of Agriculture, played a very important part, the treaty was finally sent down from Ottawa early in August, for ratification by this country. On August 16, it was signed by Secretary Lansing and Sir Cecil Arthur Spring-Rice, British Ambassador.

By the President it was transmitted to the Senate on August 22. It went to and through the Committee on Foreign Relations in a few hours; and Senator James A. O'Gorman, fully resolved to secure action at this session, was designated to take charge of it on the floor of the Senate. For several months past Senator McLean has been hard at work paving a broad and smooth road for its passage.

On August 29 it was brought before the Senate, and quickly ratified by a two-thirds majority. The swiftness with which Congress did its part in the matter amazed and delighted the defenders of the birds. That quick action is the Senate's answer to the very bitter and abusive attacks that have been made on the federal

migratory bird law and its defenders by Senator James A. Reed of Missouri, and a few of his duck shooting constituents who vehemently demand duck shooting in spring as a special privilege.

Once more the United States Senate has added to its fine and quite unbroken record in the enactment of sane and reasonable wild life protection laws. The ratification of that treaty is the most important and far-reaching step in the protection and increase of birds that ever yet has yet been taken, in any country! It extends the strong arm of federal protection over about 1,022 species and sub-species of the most valuable and interesting birds of North America.

The news, of the event of August 29, will be read with thrills of pleasure by the millions of farmers, forest owners, bird lovers and sportsmen who are interested in the increase and perpetuation of the birds of North America.

Except to Senator Reed, the people of the United States owe to the President, the entire Senate, and above all to Senator McLean a profound and lasting gratitude.

W. T. HORNADAY.

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#### NEW MEMBERS

MAY 1-JULY 1, 1916

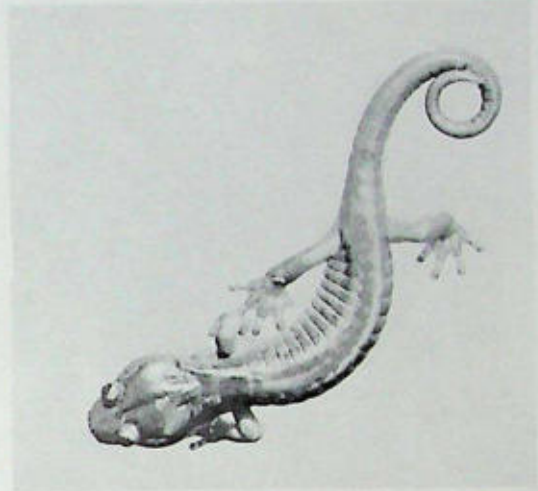
##### *Life Members*

Close, Edward B.,	Hitch, Mrs. Fred. Del.
Converse, E. C.,	Iselin, Columbus O'D.
Cory, Daniel W.,	Milbank, Dunlevy,
Douglas, Jr., Archibald,	Phipps, Henry C.,
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 Schefer, Anton H.,  
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 Wallerstein, Max.



TREE-CLIMBING SALAMANDER

#### A TREE-CLIMBING SALAMANDER.

ANYONE versed in amphibian lore usually understands that a salamander is a burrowing, terrestrial animal; a creature dwelling among tree roots, under slabs of bark, rotting logs or large flat stones in moist situations in the woods and on the borders of ponds.

But the Alligator Salamander, (*Autodax lugubris*), of the Pacific coast region, is a creature with entirely different habits. It is not dependent upon the immediate vicinity of water, and inhabits standing dead timber, preferably oak (*Quercus agrifolia*), but also has been taken out of large holes in living trees, sometimes thirty and forty feet above the ground. These holes as well as the dead, hollow trees are filled with moist debris composed of dead leaves and rotted wood-pulp, providing the creatures with the moisture so essential to the existence and well-being of all amphibians. In these situations this salamander breeds and deposits its eggs, which are kept moist by the female coiling around them until they are hatched. The alligator salamander does not emerge from the egg as a tadpole, the entire larval stage being passed inside the egg, with a perfect little salamander emerging at the proper time. This is unusual among North American amphibians.

Let us now take a close look at this queer creature, and see how it is adapted for the lofty life that it leads: The body is slender, the limbs well developed and the tail prehensile. The toes, instead of being obtusely pointed as in most other species, are curved down at the tips and end in small, knob-like expansions.

These tiny knobs do not secrete a sticky substance for the purpose of adhesion, as do the disks of the tree-toads. The tree-climbing salamander climbs by using its toes like claws, pressing its body close to the surface and helping with its strong tail. Thus it is able to climb to its "castle in the air," where it is safe from the prowling and digging enemies of its tribe. Its head is large, pointed in front and very much enlarged at the temporal region. The mouth is strongly curved and armed with large, dagger-shaped teeth, which are said to be the largest possessed by any amphibian.

The color is light or liver brown above, sometimes with a few small, bright yellow dots, and the undersides are pinkish-yellow. The skin is smooth and shiny, and a series of strong folds runs down on each side, uniting on the mid-line of the abdomen.

In the Reptile House this salamander is usually hidden under the moist moss in its vivarium. It never attempts to climb up the glass sides, as so many of the ground salamanders do, but reverses its habits to suit its environment.

RICHARD DECKERT.

The brown pelicans, which for several years past have nested in the Flying Cage, laid two sets of eggs in the crowded Pelican House before the weather was sufficiently mild for them to be placed outside. The temperature in the winter shelter was purposely kept at a low point, in the hope of curbing their precocity, but to no avail.



COLONY OF ANTLIONS

A series of craters flourished under the edge of an old house.

### OUTWITTING THE ANT.\*

By RAYMOND L. DITMARS.

MUCH that is romantic and theoretical has been written about the ant-lion and the writer has long wished to critically study this interesting insect. The ant-lion is not an isolated species, but its place in classification is a fairly important one, as it represents a fair-sized family, of several genera, inhabiting both the Old and the New Worlds.

This family falls within the order *Neuroptera*, which embraces the insects with four transparent wings, mostly carnivorous species and better known as the dragon-flies, the lace-winged flies and their allies. All of them undergo a marked and complete transformation, and the larvae of the greater number live in water. The members of the ant-lion family—*Myrmelionidae*—are exceptions, as the larvae live in the finest and driest sand, where they construct pit-falls in which they trap their insect prey.

\*This is the second of a series of articles compiled from notes made during the South Carolina collecting trip of April and May, 1916.

The best of opportunities for observing the ant-lion were presented during the writer's collecting trip in the low grounds of the Savannah River, South Carolina, during the spring of the present year. At the edge of the low grounds there is an extensive area of pine woods growing in sandy soil in which a number of ant-lion colonies were discovered. Their occurrence, however, is not general, and absolutely depends upon certain conditions relating to the proper structure of the sandy trap that procures the insect's food. The trap, consisting of a perfectly regular funnel hollowed below the level of the soil, is constructed by the ingenious larvae from the driest sand, employing only its head to clear out the space. Placing itself in the center of the pit, it loads its head with particles of sand, which it expels by a brisk upward movement, and this action is repeated with such frequency that the sand particles form an almost continuous jet.

When the sides of the funnel are so regular and sloping that they cannot be climbed, the larva buries itself at the bottom in such a way that only the threatening mandibles are exposed, ready for instant action. Before finally



DEAD INSECTS AROUND A CRATER

The bodies indicate the character of the feeding ground.

settling down to wait for its prey, by a lateral movement of the head, the insect accumulates a heap of sand upon it, and this is held in instant readiness—perhaps for hours—until the helpless prey topples over the edge of the fateful crater. If, by active scrambling, the victim gains a foothold upon the crater's brink, the heap of sand upon the ant-lion's head is hurled at it to bring it down.

With smaller insects, a stumble over the edge of the pit-fall brings a certain slide to destruction. The fine sand yields to the struggling feet, and an ingenious movement of the destroyer causes the walls of the inclined plane to shift and give way. More powerful insects are so bombarded by jets of sand from the head of the larva, that they are partially overcome by the dusty medium, and are quickly dispatched by its long mandibles.

From the methods of construction and operation of the ensnaring crater, it will be understood that the ant-lion requires sand that is dry at all times. Hence the necessity of protecting the crater colonies from rain. In traveling over the extensive areas of the sandy regions, the writer observed very few ant-lion pits in exposed places, and these were in small groups of seldom more than three to four. The colonies of great numbers were sheltered under trees with particularly heavy foliage or under shelving banks. The largest colonies were observed in deserted sheds where in the times past cattle or horses had softened the sandy floor to a considerable depth. An old house occupied by us as a collecting base was supported upon posts set in fine sand, and under this house was a series of flourishing craters, to the number of several hundred.

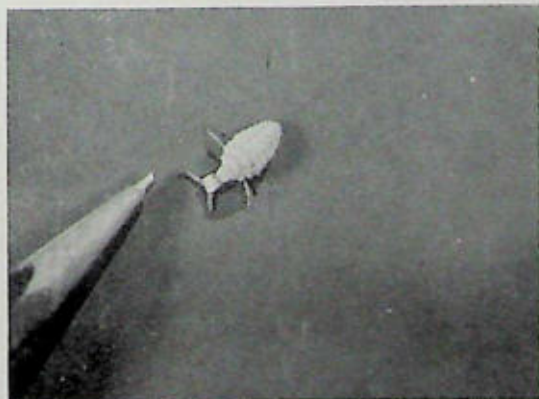
Observations of the feeding habits of the ant-lion were made in the crater colony under the

house. While ants form a considerable portion of the food, many other kinds of insects are trapped and devoured in the snares. Aside from ants, the larvae were catching small grasshoppers, minute beetles, various grubs, and occasionally flies that alighted in the pit and were instantly rendered unable to fly by a sand bombardment.

A heavy-bodied beetle, a furry caterpillar or some insect larva with tough integument, is an intruder in the crater. When a creature of that kind falls in, the ant-lion may make a herculean effort to get its head under the tumbling victim to cast him out. If this fails, he backs off through the sand and constructs a new crater a few inches away, leaving the struggling insect to ultimately scramble its way out of the funnel.

The ant-lion's prey does not appear actually to be masticated and devoured, but the body juices are sucked from it in much the same manner as a spider feeds. This explains the preference for insects with bodies that are easily crushed by the mandibles. Spiders are a favorite prey, and the writer's collection of captive specimens thrived and developed best upon them as a diet. After the completion of the meal, the ant-lion thrusts its head beneath the empty insect shell, and with an upward jerk throws the victim several inches from the funnel.

The dead insects about the craters clearly indicate the character of the feeding ground, and in the accompanying photograph will be seen the surprising number of slain about a pit-fall. This particular funnel was near a decaying post inhabited by ants, and the carcases themselves appeared to act as decoys. The ants were observed to wander excitedly among them, examining each one with tremulous antennae as though searching for missing companions. Sev-



AN ANT-LION MAGNIFIED



FURROWS MADE BY THE ANT-LION

This is done to tempt insects to follow the path to the crater.

eral ants, among the multitude treading the masses between the slain, were observed to topple into the funnel, and one ant slid to destruction as it dragged away the shriveled body of another.

Not all of the funnels fared as well, for some portions of the colony appeared to have few insect visitors and changes of funnel locations to better food areas were indicated by deserted craters into which had blown tiny wisps of debris. This is a positive indication of an unused funnel, as the ant-lion keeps the bottom of its crater scrupulously clean. If there is a general scarcity of insect wanderers over the area occupied by the colony, the ingenious trappers resort to tactics calculated to lead every stray creature directly to their pit-falls. They issue from the craters and by wriggling backwards over the level ground plow mazes of undulating trails. The tendency of small, roaming insects is to follow a furrow, and the trails lead always to the sandy trap with the omnipresent jaws and sand-laden heads of the watchful ant-lion.

The writer experimented with a colony faring poorly and already marked with several enticing trails, by building a miniature parapet of tin, about three inches high, around the entire area, debarring ground-strolling insects. After two days the ant-lions adopted the most vigorous measures, marking out the enclosed area with an elaborate system of furrows that curved and twisted in every direction.

Upon leaving the South, about thirty of the ant-lion larvae were dug from the bottom of their pit-falls, placed in flat tin boxes containing their native sand, and with a box of the sand were shipped north in order to restart a miniature colony. The little creatures necessarily were without food for eight days' time,

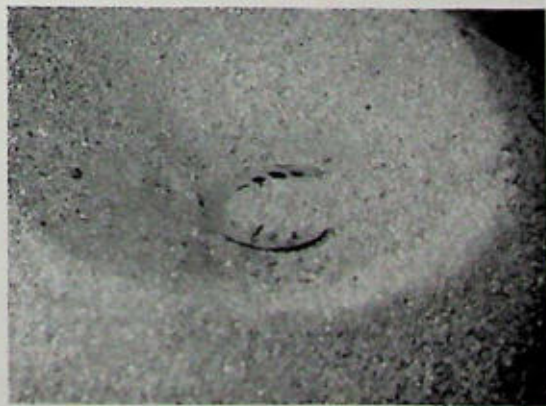
but all survived the trip. A tray eight feet long by four feet wide was filled to a depth of about three inches with the transferred sand, and within an hour after the ant-lions were placed in the tray it was populous with their craters. It was from this batch of larvae that the photographing of the life history was completed.

The collected larvae were from eggs laid in the late fall of 1915, which had remained unhatched through the mild southern winter until early spring. The larvae were full grown when collected on the 5th of May, and the colony in the tray was established on the 14th of May. The craters remained in active operation until the 20th of June, when debris accumulating in one after another indicated a transition into the pupal form, which inactive state precedes the emergence of the perfect insect.

When all of the funnels had become inactive, the sand was screened and from it the cocoons were collected. They were perfectly spherical and appear like a ball of sand that has adhered as a moist spot cakes and hardens.

They are about half an inch in diameter, but when rolled between the fingers they continue to shed sand particles until they are reduced fully a third in size. They are then seen to be tightly spun cocoons of silky substance. When opened, shed skin of the larva and the pupa are found. It wriggles vigorously and completes its development as well as if encased, showing the translucent wing cases, large green eyes and a head much like that of a dragon-fly. After being examined and photographed the cocoons were again buried in the sand and the first of the perfect insects emerged thirty days later.

The final stage of the ant-lion is a delicate, gauzy-winged creature somewhat like a dragon-fly in form, but with a fluttering, slow flight. Its



AN ANT-LION AT HOME

Only the threatening mandibles are exposed.

enormously long body would appear like an impossible development from the tiny pupa in its spherical cocoon.

At the time of emergence, the perfect insect adopts a curious method to protect its gauzy wings from injury in the sand. The cocoon is buried in the sand several inches, and as the imago breaks through, it thrusts its limbs outside of the cocoon in such a manner as to slowly drag it to the surface, then slightly above it. It then issues from the top of the silken sphere without danger of a blemish. Its life is short as a creature of the air, and eggs are soon laid which in turn hatch and produce the blood-thirsty little insects of the craters. And they in turn transform to lay eggs by late summer or fall; for there appears to be two broods of southern species.

The reader may be interested to note that all of the illustrations showing the habits and transformation of the ant-lion are from enlargements made from motion picture films. Besides the written history of this insect, the writer preserved the entire story in motion pictures.

*Sentencing the Hawks.*—Among American ornithologists and bird lovers in general, there is much discussion as to the proper attitude that should be assumed toward the Cooper and sharp-shinned hawks. As recorded in the preceding number of the BULLETIN, these avian scourges feed almost entirely on small birds. This fact has prompted many persons to denounce their crimes and demand their extermination, and influenced others to defend them on the basis that by killing off the surplus they help to maintain a proper balance in nature.

While we agree with the sentiment that no form of life should be completely exhausted, we do not believe in the existence of such a surplus of songbirds that it should require removal. Before the advent of man, the depredations of the natural enemies of bird life were of little consequence. Now, however, when the conditions are so adverse to their rapid increase, that it has become necessary to exert every effort to aid them, we think that bird-killing hawks have outlived their usefulness. Sharp-shinned and Cooper hawks are very abundant in the vicinity of the Zoological Park, and hardly a day passes that does not bring some evidence of their rapacity.

A young Cooper hawk was presented recently to the Park, and accompanying the bird was an illuminating letter from the donor, Mr. J. F. Paull, of Wheeling, West Virginia. Having secured the young bird, Mr. Paull states that he

placed it in a cage near the nest. "The first day, the old birds brought a young chicken, a mouse, a catbird, a sparrow and a meadow lark, possibly more, which they ate" . . . "The other hawk the next day brought another young chicken, a flicker and a ground squirrel." Needless to say, the efforts of these particular birds to remove the surplus have been discouraged.—L. S. C.

#### BREEDING CRANES.

In 1910, we secured from the captain of a tramp steamer, a number of rare cranes, that he had brought direct from Japan. These birds, being of hardy species, were placed at once in a corral adjoining the present Yak House, where they have remained ever since. Later on the corrals were rearranged and subdivided, so that it was found necessary to separate the flock, and an unusually fine pair of Japanese white-necked cranes, (*Pseudogeranus leucuchen*), was placed in one of the most desirable paddocks. For several years, there was no sign of mating, but in the spring of 1916, the female flattened a circle of grass in one corner of the enclosure, laid two eggs, and hatched two healthy chicks. Unfortunately, the existence of the nest was not discovered until it was too late to determine the period of incubation. One was killed by accident, but the survivor grew rapidly and now is nearly as large as his parents.

When first hatched, the cranelings were clothed in bright cinnamon, with pale green beak and legs. The tawny down has been replaced by feathers of the same hue, contrasting strangely with the gray plumage of the parents. This species, or, in fact, any other of the larger cranes, has not previously been reared in captivity in this country.—L. S. C.

The black-footed penguins, which successfully reared a young bird last year, hatched two lusty youngsters early last May. Both grew rapidly and were thriving, when the too-confident parents failed to cover them one chilly night, and both succumbed to the cold. The other two penguins, which are of doubtful sex, laid twice and incubated faithfully, but the eggs failed to hatch. These birds acted throughout like a properly-mated pair, but nevertheless we suspect that both are females. Observations of the nesting habits of these two couples yielded much interesting data, which will form the basis for a future number of *Zoologica*.—L. S. C.



THE EMUS IN WINTER

These birds endure the rigors of our northern winters without distress.

#### ITEMS OF INTEREST.

*Our Shy Giraffe.*—After two years of coaxing and resorting to various expedients to induce our giraffe to leave his stall for his outside canal, we constructed a new runway of generous width and such a gradual incline that we thought he could find no possible objection to using it. However, he continues to gaze placidly from the door and refuses to come out. We are giving him a few days to decide, after which time, if he continues obdurate, he will be pulled out with a soft rope. This is now possible, without danger of a slip, owing to the long runway. Apparently this animal labors under a delusion involving a doorway, where at some time in the past he has been injured, or received a severe fright.

*Red Squirrels.*—In the early history of the Park, we determined to exterminate the red squirrel within our boundaries, owing to that animal's deadly persistence in robbing birds' nests. The red squirrel disappeared for a number of years, and we cultivated the Carolina gray squirrel, which, owing to its docile and confiding nature, delights our younger visitors. Various clans of these gray squirrels, and members of the black phase as well, inhabit different parts of the

Park. They pry into visitors' pockets, feed from the hand and are in every way likable and attractive.

Of late we have again heard the chatter of the mischievous red squirrel in the Park, and several of the keepers investigated. They discovered an interesting condition. Ordinarily, this species is excessively wary, but led on by the boldness of the gray species, the few red squirrels that have wandered in are also soliciting dainties from visitors. One specimen found by Keeper Lansberg is so confiding it may be picked up in one's hand and stroked like a kitten,—an extreme type of confidence that quite surpasses that of the wild gray squirrel. We have found two red squirrels like this, and while we have forbidden them the free run of the Park, they are happy in large cages of the Small Mammal House. When the men are cleaning their cages, these squirrels run about over their shoulders, making no attempt to escape.

*A Prairie-"Dog" Feud.*—A feud appears to have broken out among our prairie-"dogs," and while there have been extensive arguments and much excitement, it seems that no real damage has been done. The animals occupying the northerly burrows of the village seemed to have declared warfare against a group living in the

hillocks near the southwestern portion of the enclosure. There is much popping in and out of heads, shaking of black-tipped tails, shrill calls of squatting sentries and like manoeuvres. Owing to the sharp cold of the morning hours, the fighting does not begin until well along toward noon,—and then it occurs chiefly on sunny days. Then the clans issue from their respective strongholds. The method of attack consists in rushing at an adversary that has been sitting up, chattering; taunts, and knocking him over backwards. A retreat by any one of the combatants is considered a decisive defeat. If a "dog" dives into a burrow, the victor joyously fills up the mouth of the hole with loose earth, and vigorously packs it down by butting the ground with the top of his head. The entombed and intimidated animal seems too ashamed to dig his way out for at least an hour or more.

*Tropical Specimens.*—Curator Beebe recently shipped a collection of specimens from the Society's Tropical Research Station in South America. The most important mammals were a young specimen of the yaguarundi cat, and a spotted cavy or paca. Among the reptiles was an excessively slender snake, related to our northern black-snake, which was captured while it was endeavoring to swallow a toad of considerable size. It happened that the toad thus rescued was of a particularly interesting type, and of considerably more value than the snake. A four-foot electric eel was in the shipment, but this animal received injuries during the voyage, and died shortly after its arrival. Among the specimens was a toad of large size that so puffs its body with air when disturbed, that it attains the diameter of a fair-sized plate.

*Some Huge Frogs.*—The largest frogs that we ever have observed are now on exhibition in the Reptile House. They are bull frogs of the species known technically as *Rana catesbiana*. A common idea prevails that the largest specimens of this species come from Canada, and while it is true that the Canadian bull frogs attain a great size, the largest examples come from the extreme southerly states. The Curator of Reptiles brought north from his southern collecting trip, a specimen of *Rana catesbiana* weighing two and a half pounds. The measurements of this frog are as follows: Total length, 18 inches; snout to vent, 8 inches; hind limbs, 10 inches; head,  $2\frac{3}{4}$  inches long and  $3\frac{1}{4}$  inches wide.

A friend of Senior Keeper Charles Snyder sent about a dozen specimens of *R. catesbiana* to him from Louisiana, now on exhibition, all

weighing over two pounds. The voice of these frogs is like a prolonged deep, bass chord from a heavy organ. The writer observed a number of specimens of the true southern bull frog, *Rana grylio*, while collecting in the Savannah River low grounds, but none appeared to weigh over a half-pound. They are exceedingly shy and difficult to capture. The species is easily recognized by its much pointed head.

*A New Horned Snake.*—Visitors to the Reptile House have been puzzled by a remarkable looking rattlesnake that recently arrived from Texas. This specimen is about six feet long and has a stout horn about an inch in height, apparently growing from the top of its head. A small species of rattlesnake inhabiting the arid regions of our southwest has enlarged scales over the eyes that resemble horns, but the Texas reptile is a manufactured monstrosity. A snake fancier living near the Texas-Mexico boundary line, conceived the idea of thus ornamenting rattlers for sale, and this is one of his first specimens, which he sent north as a gift.

The operation of attaching the horn, which is a rooster's spur, is a really ingenious surgical feat. By slitting the skin of the snake's head and leaving a certain amount of skin around the base of the spur, the latter appears to be grafted and to receive nourishment. We are awaiting the period of the shedding of the snake's epidermis, in expectation that a certain amount of sloughing will involve the horn during the process.

*Great Ant-Eaters.*—At the outbreak of the war we purchased animals so diligently that few additions have been necessary since that event. As we anticipated, but few new animals have arrived in New York during the past eighteen months. This has been wholly due to the war. Our most recent arrival of importance is a young specimen of the great ant-eater or ant-"bear." It is one of the few specimens exhibited here that can really be handled. The claws of these animals, used in tearing open decaying logs in search of ants, are long and formidable. A large adult example of the great ant-eater that has been in the Park for a number of years is savage and dangerous! When cleaning his cage, the keepers threaten him with a broom, but at times he sallies forward to attack. Grasping the broom, he rolls upon his back, and with a motion of his claws comparable to the sweep of a sickle, he quickly cuts and tears the broom to pieces. Owing to their temperature requirements, as warm jungle animals, the ant-eaters are kept in the Primate House.

*An Industrious Elephant.*—The Indian elephant, Luna, has developed a collecting tendency which greatly embarrasses her keepers. She discovered several iron girders, each weighing about five hundred pounds, that our iron workers had stored between two fences surrounding the elephant yards. By strenuous trunk work she managed to roll these under the corral fence and drag them, one at a time, into the building. It is a heroic task to bring even one of these girders in the Elephant House, and Luna has announced each event by raising the girder and dropping it with a tremendous crash upon the cement floor. We now will have the really formidable task of carrying out the bars, as Luna cannot be induced to reverse her order of proceeding.

*A Guilty Basarisk.*—When Keeper George Snyder found that five of his young mourning doves had been killed in the night by dashing about their cage, he was more than mildly annoyed. Further investigation showed that several domestic pigeons inside the Pheasant Aviary had been killed. It was evident that some creature had been running about the cage-top, with results only too well known to keepers of game birds. The difficulties of rearing birds in captivity are indeed manifold, but nothing is so disturbing as the depredations of vermin.

After some search, an aperture measuring two inches by three inches in a skylight shield was found to be decorated with several incriminating hairs. The evidence, however, was of such doubtful nature, that we could not determine the depredator. The hairs were too long for a rat, too pale for a raccoon, too curly for an opossum—and anyway, the space in the wire was much too small to admit either of the latter.

There was no time for quibbling in such an emergency, and that night traps of many sorts were set in promising places. The first trap inspected the following morning, one of the box type, held a snarling captive, quite unharmed. But what manner of beast was this, with the bushy, ringed tail of a raccoon, the sinuous body of a marten, and the face and temper of a cat? Gingerly picking up the trap-cage, the captor carried it and its disgruntled inmate to the Small Mammal House, where its advent was hailed with joy. It proved to be a basarisk, or ring-tailed "cat," a carnivorous member of the raccoon family, whose habitat is Texas and Cen-

tral America. The animal had escaped from its cage nearly three months before. The excellent condition of the culprit proved it to be the perpetrator of many crimes that had been attributed to comparatively innocent rats and raccoons.—*L. S. C.*

#### WASPS AT THE TROPICAL RESEARCH STATION.

By PAUL G. HOWES, *Research Assistant.*  
*Photographs by the author.*

SOLITARY wasps have always interested me above all other insects. They show a greater variation of habits and greater individuality. They possess more personality and enthusiasm in their work than other members of their order, and when I reached Guiana last February, I decided to spend some time in untangling some of the mysteries surrounding their lives.

Several years ago I made a trip across Columbia on the opposite side of South America. I was constantly traveling, and had no time to devote to insects, yet even under such unfavorable conditions, I was impressed by the richness of a field that was as yet almost untouched by scientists.

When I settled down to work on the Mazaruni River, I soon realized the vast abundance of tropical Hymenoptera, and how really colossal is our ignorance of the lives of these fascinating insects.

In the north, I have worked an entire season, and at its close had only half a dozen life histories partly completed. Here, at the Tropical Station of the Zoological Society, in a little under five months I have found over seventy species nesting. These seventy odd wasps and bees present a range of habits so intensely interesting and varied that one might spend the greater part of a life-time specializing upon them. They range in size from tiny creatures three millimetres in length, building delicate little hanging baskets that look like gossamer, to huge blue and bronze insects that carry off spiders heavier than themselves to their tunnels under ground, for their young to feed upon.

I find masons, workers in silk, potters, carpenters, collectors of resin, paper-makers, miners and many other types whose nests, often of exquisite beauty, are constructed from a great



TINY BARRELS HOOPED WITH MOSS  
These are fastened to air roots.

variety of materials. Among these insects of Guiana, architecture has indeed reached perfection. One marvels at the beauty of their creations, and at the strength and fortitude of the delicate creatures accomplishing such tasks.

One nest is a group of five perfect cells of yellow clay. Each cell is covered by a dome of the same material as thin as paper, with the convex of one fitting into the concave of the next, like a pile of inverted bowls.

It is constructed by a solitary wasp that looks unequal to the task. She places it on the under side of the mid-rib of a forest leaf, so that it is completely hidden, unless one searches carefully.

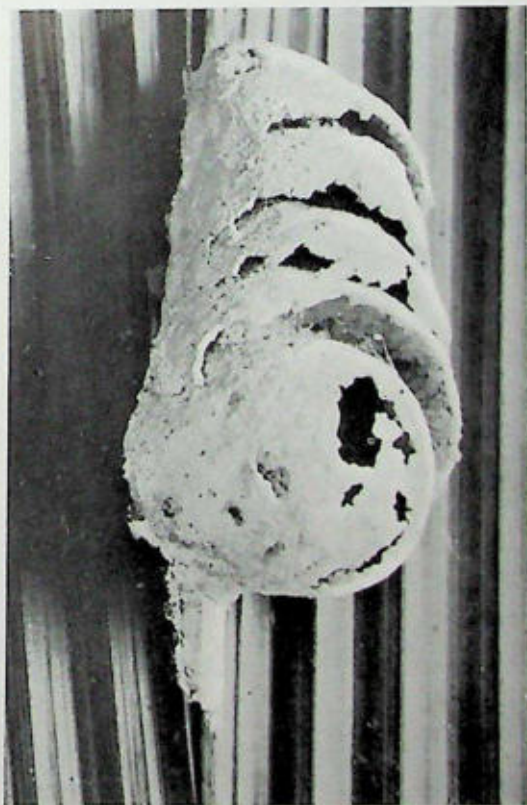
Another builds a series of earthen jugs, each a cradle for a tiny creature that will one day become a wasp. Still others make cells of sweet-smelling resin from injured forest trees, or construct tiny barrels hooped with moss and fasten them to slender air roots.

Greater wonders take place within the nests. There one watches minute, ivory-colored eggs give birth to tender insects, sees them feed and

grow from day to day through varied stages, finally to cocoon and become perfect insects like their parent.

It is impossible to condense the life of these complicated creatures into a few lines or paragraphs. I can but touch the subject here and there. In Guiana the number of nesting species appears to be governed by the amount of rainfall. In February, I found but five species at work; and the rainfall for that month totaled 4.89 inches. As the season advanced and the rainfall grew heavier, more and more species were observed, so that by the end of May, a month in which we had over fifteen inches of rain, I found forty different forms of bees and wasps at work.

In working out these life histories, I have encountered many difficulties that one does not find in the north. It is necessary, in order to make accurate observations at any hour of the day, to open the different nests and place their contents in test tubes or vials where they will be at hand at the proper moment. This neces-



A NEST OF FIVE PERFECT CELLS OF CLAY  
Architecture has attained perfection among the insects  
of Guiana.



A POTTER WASP UPON HER NEST

The cells, from two to five in number, are fastened to blades of razor grass.



A COLLECTOR OF RESIN

Freshly emerged from the cocoon  
Four times natural size.

sity exposes the precious inmates to the two dangers that are sometimes impossible to combat; ants and mould.

I have a wasp incubator which is a four-legged affair, standing in as many tins of oil, but despite all my care and a dozen daily inspections, a minute species of carnivorous ant finds its way to my precious charges, and often in my absence lays waste in a few moments the labor of days, or destroys some wasplet that I have spent hours finding and trying to rear.

With mould, it is the same story. One cannot combat such enemies except with patience. It is

trying when one has nearly completed a history, to be set back forty or fifty days by a single act of vegetable or insect vandalism!

The life cycle of a single insect, however, photographed and successfully traced from one generation to the next, repays one for all the time expended, and trouble, and the disappointments that may be met with. Above all, there is a feeling of satisfaction in the knowledge that you are doubtless the first to unfold its life story, not only to those who study the insect world, but to many who have never realized the wonders that lie therein.



WONDERS TAKE PLACE WITHIN THE NESTS

There one may watch the minute, ivory-colored eggs change to tender insects.

# ZOOLOGICAL SOCIETY BULLETIN

## AQUARIUM NUMBER

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Photograph by Edwin R. Sanborn

A LIVING PICTURE AT THE AQUARIUM  
Grouper and Jewish.

# ZOOLOGICAL SOCIETY BULLETIN

*Published by the New York Zoological Society*

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VOL. XIX

NOVEMBER, 1916

NUMBER 6

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## HOPE FOR IMPROVEMENT OF THE AQUARIUM

*By C. H. TOWNSEND.*

IT IS four years since the Zoological Society completed plans for a larger building for the Aquarium, and the City is still financially unprepared to undertake improvements on the scale proposed. A part of this BULLETIN is devoted to the presentation of a substitute plan, which, although costing but a fraction of the original plan, will do much for the relief of an institution that has always existed under unfavorable conditions.

The Aquarium is a museum of which the public makes constant use, but its equipment is such that the demands made upon it have never been fully met. It is deplorable that while other museums, which stand in the same relation to the City of New York, have all been increased in size and scope through city appropriations, and have extended their fields of usefulness, the development of the Aquarium has been arrested for lack of space and equipment.

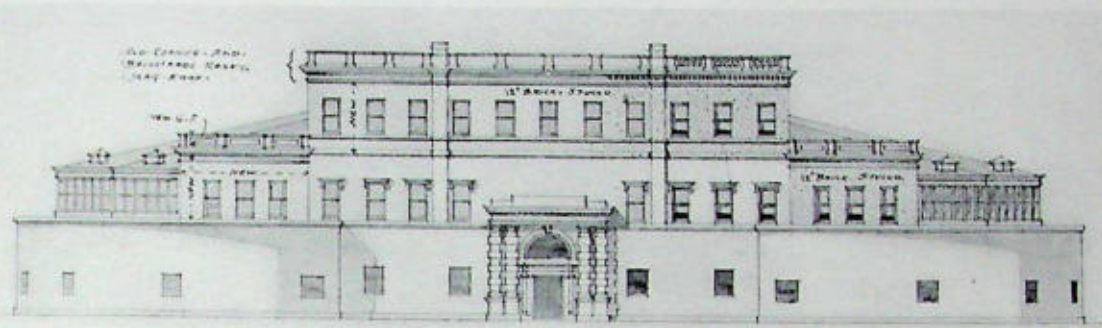
The situation is remarkable when we consider the fact that the Aquarium has always been far in the lead of the other New York museums as an attraction for the people, having for many years had more than two millions of visitors annually.

The improvements proposed would place the mechanical department of the Aquarium on a safe and sanitary basis, afford adequate space for the storage of coal, allow some increase in space for exhibits, and provide a little more office space.

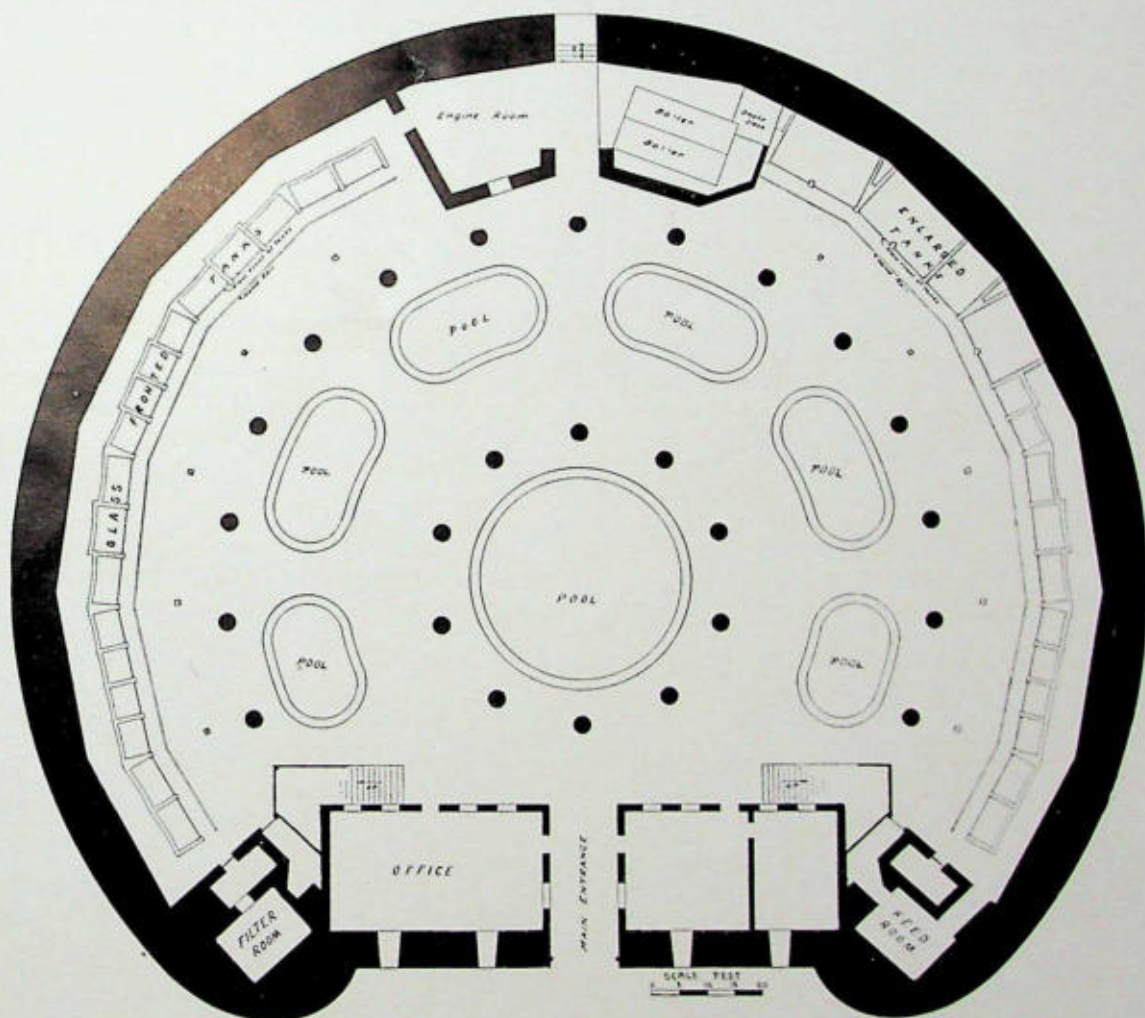
The extensive heating, pumping, filtration and refrigerating plant at the Aquarium has been in operation for twenty years. It is not

only out of date and costly to operate, but is unsanitary and dangerous to the health of those who use the building. The Aquarium has always lacked suitable coal bunkers, and the engineering department depends for its supply on deliveries made every four days. A prolonged blizzard such as occurs every decade in New York, would make deliveries of coal temporarily impossible, and such a disaster would cause the loss of the entire marine collection, the maintenance of which depends upon the continuous running of steam pumps. At high tides the fire room and the small coal bunkers are invaded by the sea, and sometimes are under water to a depth of one and a half feet. The tidal water at such times penetrates throughout the pipe galleries under the main floor, making them temporarily inaccessible. No branch of the municipal service would tolerate such conditions. The Zoological Society is assured by its engineer that it will be possible to remove the entire mechanical department from the section which it now occupies, to the north side of the building. Suitable quarters can there be provided for all machinery, by reconstruction of the basement.

By the purchase of electrical power and by reducing the steam plant, the amount of coal used annually and the cost of operation, can be considerably reduced. The removal of the machinery from the south side of the building will permit of the reclaiming of all of that section for much needed exhibition space, and will permit of the construction of a number of tanks of much larger size than any now in the building.



FRONT ELEVATION OF THE AQUARIUM SHOWING PROPOSED THIRD STORY  
This addition is made necessary by the removal of the machinery to the front of the building.



GROUND PLAN OF THE AQUARIUM SHOWING POSITION OF BOILER AND PUMP ROOMS  
It is proposed to remove the entire mechanical department from the rear, to the basement of the front of the building. The recently enlarged tanks are shown at the right, and this series of large tanks can be extended into the space now occupied by machinery.

The administrative work of the Aquarium is carried on without adequate space. It is very important that a third story be added to the north side of the building. This addition will greatly improve its external appearance, as will be seen by a glance at the architect's sketch of the front elevation presented herewith. An examination of the ground plan of the Aquarium, reproduced in this BULLETIN, will serve to show the large amount of space that can be reclaimed for exhibits, by the removal of the boiler and pump rooms—a space that amounts to about one-fifth of the circular portion of the building.

The plans described above have been approved by the Executive Committee of the Zoological Society and the Commissioner of Parks, and an application for the issue of corporate stock for these expenses is now pending before the Board of Estimate.

Public spirited citizens have been very generous to the up-town museums, and might do much for the development of the Aquarium if it were better housed and could present a better appearance. The excellence of the collections in the Aquarium can not entirely compensate for the structural defects of the wretched and outworn building which houses them.

The various handicaps under which the daily work of this popular institution has been done, are at once apparent to any one who inspects the building. Space for working equipment, for instance, is so limited that supplies are stowed in out-of-the-way corners; the entire attic is a fire trap; the refrigerating plant is dangerous; the pipe galleries are exposed to high tide. In fact, the establishment is open to criticism in practically all its branches, and the only remedy lies in a much more radical improvement of the unsightly old Castle Garden building than has yet been permitted.

#### LARGER EXHIBITION TANKS AT THE AQUARIUM.

By C. H. TOWNSEND.

IT has long been recognized that the glass-fronted exhibition tanks of the Aquarium as originally constructed, are too small, both for the comfort of their occupants and for the best effects in the exhibition of aquatic animal life.

The larger tanks, located on the main floor of the building, are not more than seven feet in length, with a depth back from the glass fronts, of four feet. The still smaller tanks of the balcony, constructed of wood, serve fairly well

for the keeping and exhibition of small forms. The main floor tanks being of heavy masonry construction, it was always considered inadvisable to enlarge them. Their defects were such, however, that it seemed worth trying, and seven of them have already given place to four tanks of ample size.

This improvement was accomplished without the expenditure of special funds, the work being done by Aquarium employes as opportunity afforded. The first large tank was completed in April and the fourth in October. Being built of re-enforced concrete, the principal outlay has been for cement and other materials. The cost for each tank has been a little less than fifty dollars.

The method of enlarging was to combine two tanks, by removing the partition between them, as well as their back walls; setting the latter twelve feet back from the glass.

This extension of the exhibition tanks involved the removal of the reserve tanks behind them, but the latter are no longer required as their occupants now enjoy the increased space afforded by the new tanks, and thrive accordingly.

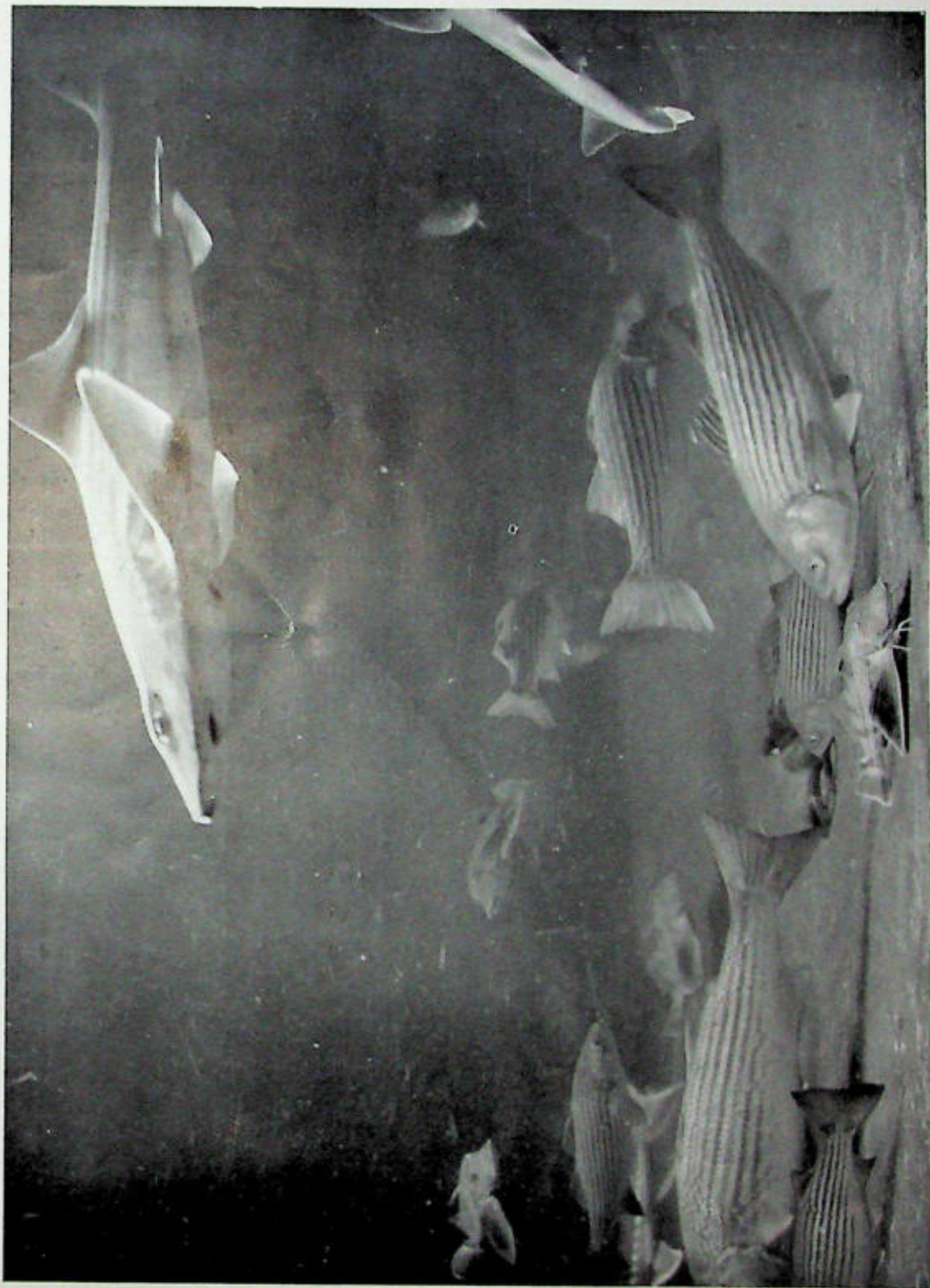
The *under-water* effect of the enlarged tanks is excellent and is much appreciated by visitors. The increased space has made it possible to exhibit sharks and sturgeons behind glass, that formerly had to be kept in the large open pools on the ground floor.

The wreck of an old boat in one of these large tanks has proved to be an interesting accessory. It was discovered recently during excavations for the subway at the intersection of Greenwich and Dey streets, where it has reposed for generations. The parts exhibited in the Aquarium consist of the forepart of the keel, stem, several ribs just back of the stem, and portions of the planking of the hull. It was presented to the Aquarium by direction of Mr. T. P. Shonts.

#### A MANATEE FROM THE AMAZON.

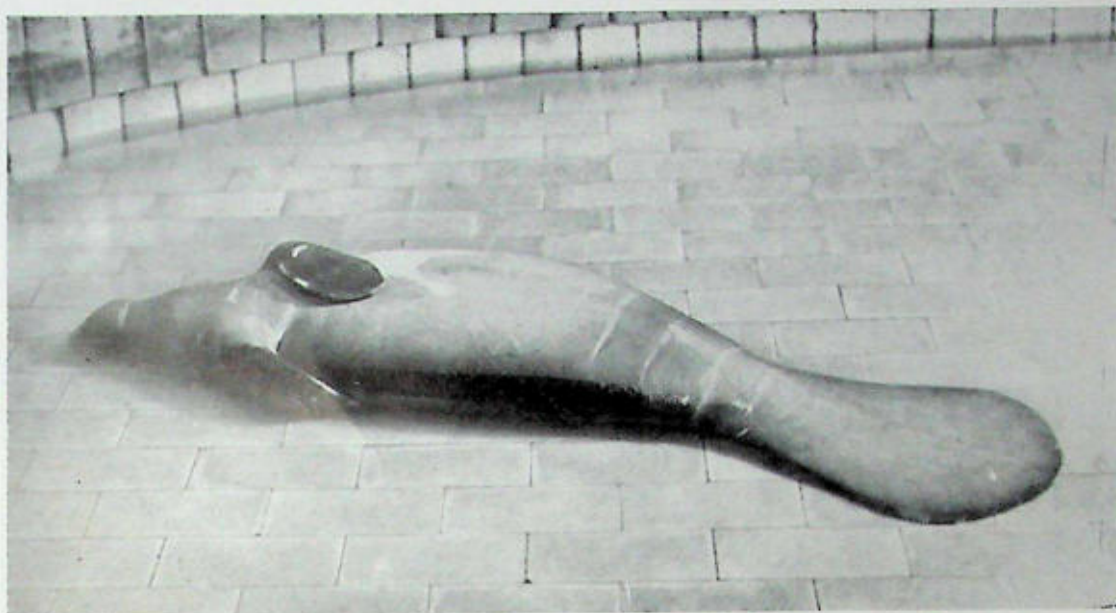
THE fresh water manatee of the upper Amazon, (*Manatus inunguis*) has been exhibited alive in Europe, but the specimen now at the Aquarium is the first to be shown in this country.

It was purchased on the Amazon for the Aquarium by Capt. R. H. Torrible of the Booth Line Steamer "Stephen," and arrived in New York on July 3, 1916, in excellent condition. During the voyage it was kept in a roomy tank



Photograph by Edwin R. Sumborn

**VIEW OF ONE OF THE RECENTLY ENLARGED EXHIBITION TANKS**  
Four of these enlarged tanks have already been completed.



MANATEE OR "SEA COW" FROM THE AMAZON

Not dead, but resting on its back.

of fresh water and fed on bread, lettuce, cabbage and such vegetable trimmings as were available.

It is smaller than the brackish water manatees, (*M. latirostris*) from Florida, which were brought to the Aquarium several years ago, being only five feet in length.

The nailless flippers and white breast, two of the characters which distinguish it from other species, are easily seen. Like our other manatees it turns on its back when the pool is drawn down for cleaning, and remains in that position

until the water again becomes deep enough to float it.

Since coming to the Aquarium, our manatee has fed chiefly on eelgrass (*Zostera marina*) and bread, eating a loaf every day. Lettuce he no longer cares much for. This manatee is much more active than any of the manatees brought from Florida, often swimming actively around the pool. It is also the most sociable manatee ever kept here and will come to the edge of the pool any time to have its back rubbed.

#### FISHES THAT HATCH EGGS IN THEIR MOUTHS.

By C. H. TOWNSEND.

THERE are two species of salt water catfishes to be found on the New York coast, the gaff-topsail catfish (*Felichthys marinus*) and the sea catfish (*Hexanematichthys felis*). Both species have about the same range along the Atlantic coast, being found from Massachusetts to the Gulf of Mexico.

They are interesting to naturalists on account of the peculiar manner in which they care for their eggs, which after being deposited are carried in the mouth of the male fish until hatched.

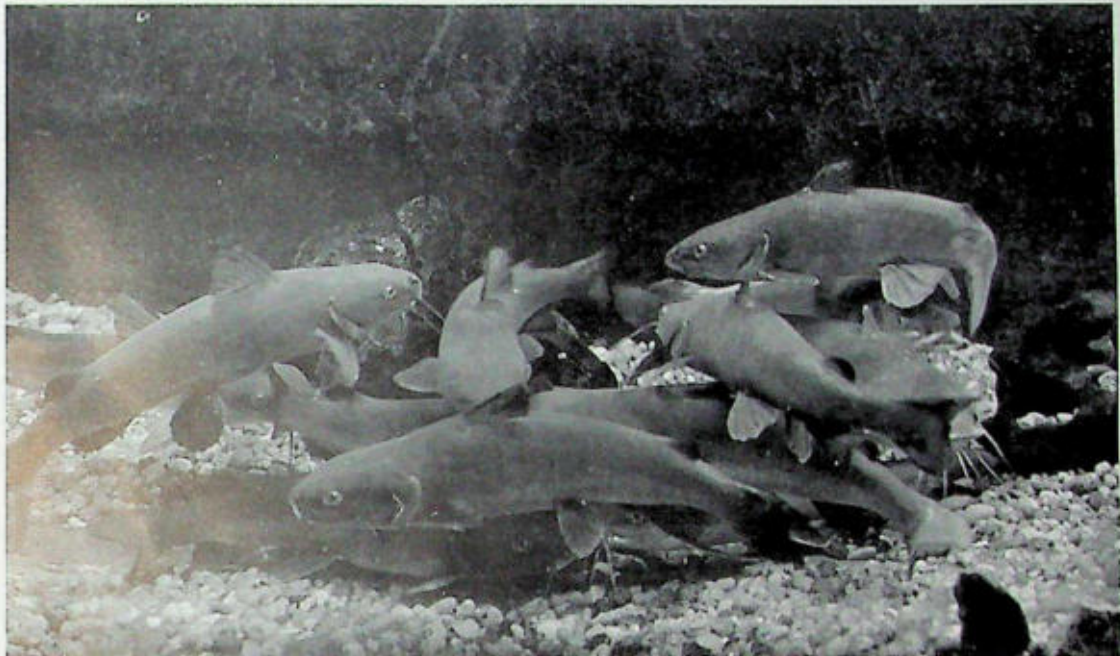
This habit is practiced by marine fishes of several genera inhabiting other regions. It is definitely known that the gaff-topsail catfish carries the eggs in this way, and it is in all

probability the same with the sea catfish.

Prof. E. W. Gudger has taken as many as fifty-five of the eggs from the mouth of a single male of the gaff-topsail catfish and has also found the newly hatched young in the mouth of the fish. He determined by dissection that the eggs are cared for by the male parent. The eggs are among the largest in size produced by any of the bony fishes, and are described as resembling white grapes.

The male fish must of course cease feeding while the eggs are in process of incubation, as the mouth becomes quite distended with its load of eggs.

The gaff-topsail catfish is so called on account of the height of its dorsal spine. The sea catfishes are smooth-skinned fishes, reaching a length of two feet and a weight of five or



Photograph by Elwin R. Sanborn

SEA CATFISH THAT HATCH EGGS IN THEIR MOUTHS

six pounds, but the specimens so far received at the Aquarium have been of less than half that size. Both species live well in captivity and have been taken at Gravesend Beach, New York Bay, on several occasions, but they do not seem to appear in our waters every year.

The Aquarium has at present twelve specimens of the sea catfish (*H. felis*), the largest of which is fourteen inches in length. They have lived in the Aquarium for three years.

These fishes have been found to feed largely on small crustacea, mollusks, worms, sea anemones and algae, together with some small fishes.

The sea catfishes are but little esteemed as food fishes, but according to Mitchell are really good eating.

When the spawning season arrives, efforts will be made at the Aquarium to determine whether the eggs of the sea catfish are actually cared for in the same way as in the gaff-topsail catfish.

FISH POISONING (ICHTHYO-  
TOXISMUS).

*Is not this simple ptomaine poisoning?*

By L. L. MOWBRAY.

Much has been said and written about the poisonous fishes of tropical and sub-tropical seas. It is a known fact that, among people eating the same species at the same time, even

caught in the same locality, some have been poisoned while others have not. Among fishes eaten by man, the species considered most likely to be dangerous as food during the season from May to October, are the barracuda, two species of kingfish, three species of jack, red rockfish, and tiger rockfish.

The barracuda (*Sphyracna plicuda*) is a pike-like fish, inhabiting both shallow and deep water, and is often seen hiding behind the Gorgonias, waiting for its prey.

The mulletto kingfish (*Scomberomorus regalis*) and the common kingfish (*S. cavalla*), are swift and active, and are among the best of food fishes.

The jacks (*Caranx hippos*, *C. ruber*, and *C. crysos*) are swift swimming surface fishes, usually traveling in large schools. Their food consists of the anchovy, pilcher, hog mouth fry, and squid and crabs that live among the Gulf-weed.

The red rockfish (*Mycteroperca venenosa apua*) and the tiger rockfish or gag (*M. tigris*), live on rocky coral bottoms and often in very deep water. Their food consists of small bottom fishes and crustacea. Both species are captured by hand lines and in traps.

All of these fishes are carnivorous, preying upon various species of fishes and invertebrates. There is no evidence whatever that they feed at any season upon forms which would render their flesh unwholesome.

While in the Turk Islands I questioned many fishermen concerning the fishes that were poisonous, the effects of the poison, and at what seasons the fish were most dangerous. Without exception their reports tallied. All agreed that there were two forms of the disease; that the fish from the north side of the Islands were the most dangerous, those from the south side not being so likely to prove poisonous. This seems incredible, as the island of Grand Turk, most densely populated of this group of islands, is only one and a half miles wide by six miles long, and lies in the trade winds and the Bahama current, which move all surface food at a considerable rate to the westward. I consulted Dr. Geogaghan, then the Medical Officer of the Colony, who kindly gave me a description of the symptoms, which he had personally experienced in both forms of the disease.

Dr. Geogaghan said: "To my knowledge the common poisonous fish are barracuda, jack, and mullet kingfish. In certain places, for some reason or other, the barracuda is more likely to be poisonous than if caught elsewhere.

"There are two distinct kinds of poisoning from these fishes. The ordinary type is similar to ptomaine, being in the nature of a simple gastroenteritis of an irritative sort. It is characterized by acute spasmodic pain in the stomach, diarrhoea, and vomiting, coming on from ten to twenty hours after eating the fish, and subsiding readily under treatment. There is occasionally headache, usually fever (101 to 102 degrees F.) and a rapid pulse (90 to 100). Generally speaking, it is an acute gastroenteritis.

"The other form is in the nature of a toxemia. I have never seen a case following on the eating of jack, but can not be certain on this point. The symptoms are slow to subside, sometimes lasting for months. It starts from two to six days after eating the fish, very seldom less than two, and usually three or four. There is repeated pain of a dull resistant type over the region of the pancreas; constipation; slow aching pains in the joints, especially in the knees and back, without any physical signs; pain behind the eyes and headache, acute irritation of the bladder with frequent burning and tickling sensation.

"The joint pains are called "bone-pains" here, and are similar to the pains of influenza, though more particularly associated with the joints. There is an intense feeling of lassitude, debility, and subnormal temperature.

"Naturally clinical cases vary in severity. Occasionally the two forms of poisoning are combined, one following the other. I look on the first as a simple irritative disturbance of the intestine which throws off the irritant in the usual way. The second is a real poisoning of the system. I have had both myself and it was many months before I was rid of the joint-pains of the second."

The Turk Island species described herein are also among the principal food fishes of Key West and the Bermudas, excepting the kingfish, which is seldom taken at Bermuda, and poisoning is unknown in these localities.

After observing the conditions and the manner in which the fish are handled, I have reached the conclusion that the reason they are poisonous in one region and not in another, is that in Bermuda and Key West almost all fishing boats have live-wells, and therefore usually bring their fish to market alive, while in the Turk Islands and Bahamas the fish are killed and allowed to remain in the sun until the shore is reached—sometimes five or six hours after they are caught.

All of the fishes considered poisonous are of soft flesh and rich in gastric juices, and are therefore the most likely to decay quickly; and, when eaten in a partially decayed condition, cause *ptomaine poisoning*. Naturally some are more poisonous than others. Those caught in the morning are exposed to the sun's rays much longer, and are therefore much more decomposed.

The fishes, when examined externally and internally, appeared to be in the finest condition when caught, and I could detect no difference between them and those of Bermuda or Key West. I have seen specimens of Grand Turk Island with the scales standing almost on edge through the decomposing of the flesh, which, forming gases, expanded the fish. These fish are frequently sold from house to house, though caught the day before and in a half putrid condition. It is probable that if, when caught, the fish were eviscerated and bled, a case of poisoning would be a rarity.

An interesting antidote for fish poisoning is used by the natives. When a fish has been eaten that is suspected to have been poisonous, the bones are saved for twenty-four hours, within which time, if at all, symptoms should appear. On the first indication of trouble, the bones are roasted, pulverized, and made into tea for the patient. Belief in the efficacy of this treatment is implicit, provided the bones of the right fish have been used.

## ZOOLOGICAL SOCIETY BULLETIN

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Published bi-monthly at the Office of the Society,  
111 Broadway, New York City.

Yearly by Mail, \$1.00.

MAILED FREE TO MEMBERS.

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ELWIN R. SANBORN,

Editor and Official Photographer

VOL. XIX, No. 6

NOVEMBER, 1916

## TUNA IN NEIGHBORING WATERS.\*

IN the November, 1910, BULLETIN, notice was made of the occurrence of the tuna or tunny, otherwise known on this coast as the horse mackerel, in considerable numbers off the New Jersey coast. Many of these fish were taken that summer off Barnegat and Asbury Park and reports of their appearance have reached the Aquarium each year since then.

During the past six years they have been taken also in large numbers in the waters about Block Island. In the Forty-fourth Annual Report of the Rhode Island Commissioners of Inland Fisheries (Jan., 1914) Mr. Chas. W. Willard of Westerly, R. I., called especial attention to the development of the tuna fishing industry and to the opportunities for the sportsman who may care to engage these big fellows with rod and reel.

According to Mr. Willard, large numbers have been taken on hand lines baited with a wooden jig made bright with aluminum paint. Only the smaller fish, weighing fifteen to seventy-five pounds, can be handled in this manner, for larger ones either break the lines or tear out the hooks and escape. The larger fish, weighing up to six hundred pounds or more have been taken frequently in traps or with the harpoon. Prices have averaged four to five cents per pound.

Hundreds of sportsmen have tried their hands at angling for these hardiest of all game fish and with great success.

\*Since the above article was written, the catching of tuna off Block Island has been followed vigorously, especially by anglers. The Atlantic Tuna Club, organized in October, 1914, with headquarters at Block Island, now has 184 members divided among 19 states. During the months of August and September, 1916, large numbers of tuna were taken with rod and reel, some of them weighing from thirty to forty pounds.

Some idea of the abundance of the tuna in the Block Island waters may be gained from the report of the deputy assigned to the task of collecting data of the fishery for 1913. "From the 25th of July to the 20th of October, 10,000 were caught by hook and line, averaging from fifteen to thirty pounds. In the same period, 500 were taken in traps weighing from 500 to 800 pounds, and taken with the sword-fish iron, 150 running from 400 to 900 pounds."

In the Westerly, R. I., *Sun* for July 30, 1914, Mr. Willard further reported the presence of the tuna in large numbers in the same region.

The region about the Santa Catalina Islands off Southern California has long been famous as a resort for anglers interested in the absorbing and often wearisome sport of landing a tuna with rod and reel. The well-known Tuna Club was organized there, drawing its membership from those who had been successful in landing a large fish. Sportsmen in the eastern states will welcome the opportunity to try their tackle on these superb fish without having to undergo a trip of several thousand miles across the continent. The presence of tuna in large numbers for seven years in succession in waters so near at hand will doubtless be of interest to all anglers.—R. C. O.

## STRANGE SEA FISHES GOOD FOR FOOD.

By W. I. DENYSE.

FEW persons are aware that there are a number of sea fishes in our local waters that are perfectly good for food, but which are seldom used.

The sea raven (*Hemitripteris americanus*) when skinned and the backbone removed, furnishes two pieces of flesh that either broiled or fried are excellent. The common sculpin makes a good stew and is also very good fried. The tail of the big angler (*Lophius piscatorius*) when broiled or boiled is quite equal to the ordinary sea fishes as food.

The skates or rays are edible and much used for food in other countries. The flesh of the skate when boiled tastes much like lobster, and many so-called lobster salads may consist chiefly of skate meat with a little lobster meat added for the proper coloring.

The dogfishes (*Mustelus canis*) and (*Squalus acanthias*) are good food fishes that will eventually be in demand.

On the west coast of England they are utilized both fresh and salted. At Folkstone, quar-

of them are salted, then freshened and afterwards smoked, when they are called Folkstone beef.

Our native dogfishes are now being eaten to a limited extent in Canada and New England.

The writer has personally tried young drumfish, eel pouts, conger eels and even the despised toad fish, and found them palatable.

#### THE CAPTURE AND TRANSPORTATION OF A LARGE SHARK.

By W. I. DeNyse.

IN anticipation of obtaining a large shark for the Aquarium, a boat was prepared for transporting it. An old dory twelve feet long, such as fishing smacks use, was converted into a well-boat or floating live fish-car. Two feet from each end a bulkhead was constructed from the bottom of the dory to the top rail, making the central part of the boat available for a water compartment. This section was decked over with two hinged doors running fore and aft, which could be raised to admit specimens.

Openings were made in each side of the boat four inches above the bottom. The openings were four inches wide and eighteen inches long, and covered with heavy half-inch mesh wire netting. Numerous three-quarter inch holes were also bored in the bottom of the boat. The length of the well being eight feet, it made an ideal conveyer for the shark.

A motor boat was hired at Gravesend Bay to tow the well-boat, and on Monday, September 11, a start was made from the Bay at three in the morning, for the pound nets along the New Jersey beach at the southern end of New York Bay. At daybreak the pound nets were reached, just as the fishermen were about to "haul" them. A large shark was at once located in the pound net of Capt. Jacob Schnoor, and it was transferred to our well-boat without injury, and the hatch closed. Then commenced the journey to the Aquarium twenty-one miles away.

The sea was rough and the tide ahead all the way, but we reached the slip beside the Aquarium at eleven o'clock, having been four and one-quarter hours on the way. The transfer to the large pool in the Aquarium was made in five minutes. A large canvas was placed on the landing stage to which the shark was quickly transferred. The canvas was seized along the sides by several of the Aquarium men, and the twisting and rolling shark was rushed into the pool, where it was soon swimming about, very

little the worse for its capture and hurried trip to the Aquarium.

This specimen, a sand shark (*Carcharias littoralis*), was eight feet long. It lived six weeks, or five weeks longer than any other large shark ever brought to the Aquarium.

#### AQUARIUM ATTENDANCE.

THERE is little doubt that the recent decrease in the number of visitors at the public museums of New York, is attributable to conditions resulting from the war in Europe.

For eight years the annual attendance at the Aquarium exceeded 2,000,000, amounting in 1913 to 2,205,729 persons.

In 1914, the attendance fell to 2,029,707 after five months of the war.

In 1915, after twelve months of war, the attendance fell to 1,538,831, while for 1916, the attendance to September 30 amounts to 1,212,036. This number, compared with the attendance for the same months of 1915, shows practically no decrease, and we may therefore expect about the same total for 1916 as for 1915.

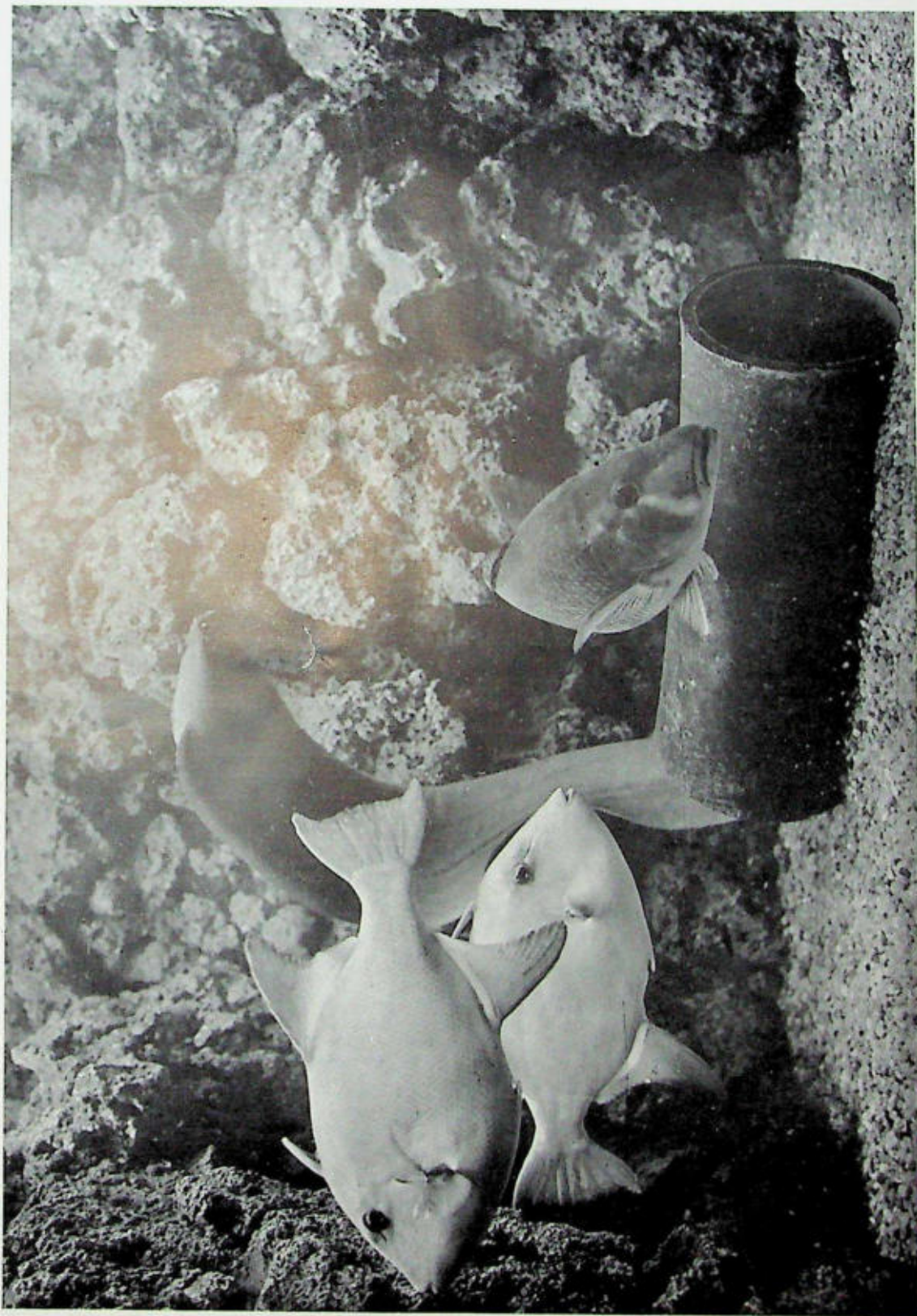
After the commencement of the war there was a decrease in transatlantic steamship travel and in immigration, both of which served to limit the number of persons passing through New York City.

The twelve months of war in 1915, as compared with the five months of war in 1914, produced more effect. Immigration from Europe has practically ceased and the legion of tourists going abroad has been reduced to a mere remnant. These conditions continue and may be expected to continue for some time to come.

Meanwhile the annual attendance figures for the Aquarium show a tendency to become stationary.—C. H. T.

Miss Ida M. Mellen, who has been appointed secretary and stenographer at the Aquarium, holds not only a certificate as an expert amanuensis, but comes to the Aquarium with an excellent training in biological work. She has had the advantage of academic and normal school training, followed by special biological studies at the Marine Biological laboratories at Woods Hole, and at Cold Spring Harbor.

Mr. Robert Sutcliffe, clerk of the Aquarium, has been with the New Jersey militia at Douglas, Arizona, since June.



GREEN MORAY, OCEAN FILEFISH AND DOG SNAPPER

Photograph by Elwin R. Starbott

## A PECULIAR HABIT OF THE MORAY

By CHAPMAN GRANT

SUCCESSFUL combats among some of the lower animals seem to require an empty stomach. To satisfy the cravings of hunger, an animal will fight against heavy odds, but when outclassed it will often give up its latest meal, at once increasing the possibilities for speed or fight and offering a bribe to the enemy to escape further pursuit. The parasitic jaeger regularly exacts tribute from gulls in this way. Kipling says that the tiger is hunted after he has eaten his fill and is taking his siesta—with an empty stomach and senses keen he could fight or retire.

Animals have strong abdominal muscles and birds possess contractile muscles which enable them to disgorge. Fishes, too, have the power to disgorge by simple muscular contraction, as witnessed in the case of the giant grouper or jewfish which swallows large spiny lobsters whole, many of them, in fact, if available. Some time later he ejects the empty lobster shells which his powerful digestive juices have colored as bright a red as if boiled. The eel-like moray, however, has no such muscles which can be used for disgorging, or if he has such muscles at least does not use them, but resorts to the following remarkable expedient observed by the writer:

While trapping fishes for the Aquarium at Key West in 1912, one of the wire fish-pots caught a number of panfish called "grunts." A three-foot green moray had seen this inviting meal, found his way into the trap and eaten all the fish it contained. When the round of the traps was made, this particular one held a few frayed remnants of crawfish which had served as bait for the fish, a sluggish moray looking like a green Christmas stocking well filled and the panfish visible in outline only. We had plenty of morays at the Aquarium at that time, so I was going to release this one for future use should our stock in New York get low. The fishermen with me wanted to kill the moray for they dread its sharp teeth; in fact, it is hard to keep a Key Wester in the same boat with one. The moray is also looked upon as a thief of that which the fisherman thinks is his birthright; the claim of priority of the moray availing nothing. I emptied this specimen onto the deck to watch him a few moments before dropping him overboard. The fish, which is normally very aggressive, when cornered, could neither fight nor escape in his stuffed condition. Heroic measures were necessary. The swallowed fishes must be jettisoned. To accomplish this, the

moray raised the head and fore part of the body, turned it to the right across the hinder part, and then under and out through the loop, thus forming a simple knot—nautically a thumb knot. By contracting the body, he tightened the knot; and, holding the hinder part of the body rigid, proceeded to back the forward part out through the loop. In other words he tied a loose knot in himself, tightened it, held the hinder part of the body rigid and untied the knot again. The first time I thought it merely an aimless writhing. A second time the movement was attempted with no result. The third time, growing desperate and probably in need of oxygen, he drew the knot very tight and hitched the forward part of the body backwards through the loop. At the first hitch nothing happened, but at the second, an eight-inch grunt fish was forced out of his mouth, tail first; another hitch produced another grunt, and I could well imagine the moray grunting had he possessed vocal powers. After five grunt fishes had escaped him, each locking a little worse for wear than the one preceding, came a bedraggled Bermuda chub, cooked white by the digestive juices. Now completely disgorged, the moray lay dazed for an instant, but at a touch he slipped lightly into the sea and wriggled off to search for another meal.

On two other occasions I witnessed this remarkable performance and had to conclude that it was not accidental, but the regular and purposeful way in which a moray reverses the feeding process.

The same means is resorted to when he is trying to disengage himself from a hook. If held dangling in the air, the moray will double on himself, tie the knot and then pull his head out backwards. It has always been my experience that the hook or line broke at this juncture, allowing the fish to escape. Mr. Mowbray, however, states that he has seen morays strangle themselves when caught with strong tackle.

## PORPOISES AT SEA.

By C. H. TOWNSEND.

THE two small photographs reproduced in this BULLETIN, showing porpoises racing under the bows of steamers are interesting in spite of their imperfections. The one made by Mr. Greenlee shows a porpoise with a shark sucker (*Remora*) attached to each side of its tail, while the one by Mr. Chapman Grant shows, although very dimly, a small baby porpoise racing close beside its mother. Mr. Grant



Photograph by C. Grant

**PORPOISES RACING UNDER THE BOW OF A STEAMSHIP**  
In this photograph the porpoises are entirely under water, the female in advance having a baby porpoise swimming beside her.



Photograph by E. S. Greenlee

**PORPOISES RACING UNDER THE BOW OF A STEAMSHIP**  
The porpoise at the left has a shark-sucker (*Remora*) attached on each side.

observed that the little fellow managed to maintain the pace set by its parent. It is difficult to make photographs of porpoises under such conditions, because they keep just below the surface, merely protruding the tops of their heads to breathe. Their speed at such times is of course equal to that of the vessel.

Mr. J. K. Nye, of New Bedford, Mass., informs me that he "timed" a school of porpoises off the coast of South Carolina, when the vessel was steaming at the rate of twelve miles an hour. The porpoises remained with the vessel about one hour. On another occasion when the steamer was running at the rate of fifteen miles per hour, a school of porpoises remained near the bow for nearly two hours.

I have seen a school of porpoises in the inland passage to Alaska, remain near the bow of the United States Fisheries Steamer *Albatross* for nearly three hours, while the vessel was maintaining a speed of nine miles an hour. This happened at night, and as the sea was smooth and phosphorescent, the movements of the rapidly swimming porpoises made a rarely beautiful sight.

Porpoises could no doubt swim much faster than fifteen miles an hour, but would not be likely to remain long with a very swiftly moving steamer. Careful observations made on board some very fast steamers would furnish interesting information on the speed attained by porpoises. Steamship passengers are always interested in these lively animals, but not one

person in a thousand, perhaps, thinks of ascertaining the actual speed of the vessel and the length of time a school of porpoises may accompany it.

#### NOTES ON THE PERAI.

*From the Tropical Research Station of the Zoological Society.*

*By G. INNESS HARTLEY.*

**T**HE perai, perhaps better known as the piranha or cannibal fish, is one of those mysterious inhabitants of the South American fresh waters, of which very little appears to be recorded. Like the barracuta of the Caribbean and other southern seas, wherever the tropical rivers run fresh, it is an object of fear to both men and beasts. Many gruesome tales come to us of its depredations and savagery.

The family of the Characins, to which the perai belongs, is very large, and composes, according to Eigenmann, more than one half the fresh-water fishes of British Guiana. Though usually smaller, the perai sometimes attains the length of eighteen inches. It is flat and rounded, unlike most other ferocious fishes, and is somewhat similar, at first glance, to our common porgy. Both the upper and lower jaws of its not very large mouth bear a row of sharp-pointed, razor-edged, triangular teeth, which, like the teeth of a shark, can shear cleanly through soft flesh. They can nip off only a



Photograph by Paul G. Howes

THE PERAI (*ROOSEVELTIELLA NIGER*)

small piece at a time, but considering the hundreds that gather about the unfortunate animal that unwarily falls within their reach, they are indeed, a menace. Once blood begins to stain the water they become a hoard of blood-crazy demons.

In the upper reaches of the rivers every animal that by chance, flounders through the water, is their prey; even the birds that flutter down to drink are often snapped up; nor is man exempt. Col. Roosevelt tells how various members of his party were bitten, and how wounded animals, even cayman, are often partially devoured before they can be recovered from the water into which they have struggled or fallen after being shot. I have seen wounded birds, when only a few feet from the shore, dragged down, not to come up again. Splashing and rippling seems to attract rather than frighten them away.

Natives, when entering the water, do so with care and quiet, though, it is true, during my experience with them, none were ever in any way attacked; and the children daily spent much time playing about waist-deep in places where perai abounded. In the higher levels of

the rivers, where food is less profuse, the perai doubtless are more ferocious and will attack any living thing even though no blood oozes from it as an attraction. There have been cases where persons, idly trailing their hands in the water from the side of a canoe, have lost one or more fingers from the cruel jaws.

The question whether the perai is a bottom or a surface fish is a much-mooted one. Probably it is both. Time and again, I have seen them playing near the surface, often leaping clear of the water. Again, to catch them on a hook, it is best to have the bait near the bottom. The Indians, to catch

them, hold the dripping entrails of a freshly killed agouti just over the water so that the ends trail and the blood spreads away with the current. The perai, its craving aroused by the thin taint of blood, moves up the stream until it reaches the dangling morsel and greedily seizes it. Then there is the twang of a bow-string; the fish is transfixed by a long, hollow, spear-like arrow, and soon finds itself twisting and biting with others of its kind in the bottom of the "woodskin." They are welcome articles of food to the natives, but to the white man their flesh



Photograph by Paul G. Howes

HEAD OF THE PERAI



MUSKALLUNGE (*ESOX MASQUINONGY*)

This specimen is four feet long and has lived in the Aquarium four and a half years.

Photograph by Edwin R. Sanborn



STRANDED "BLACKFISH" (*GLOBICEPHALUS MELAS*)  
Folly Island Beach, S. C.

is rather soft and has a slight muddy taste, while there is a great abundance of bone.

Sometimes, when desirous for a change of diet, one of us would take a rod and go down to the banks of the river. The best way to catch the perai, we soon found, was to fish from a boat anchored a few yards from shore where the mud bars shelved steeply down into deep water. The fish seemed to swarm along this steep bank, while a few splashed about in the shallows nearer the forest clad shore. Usually the bait was the flesh and entrails of some bird or animal, but, as excellent as any, were the entrails of the perai. No food seemed repellent to them. In their stomachs I have found fish, birds, pieces of flour dough used by the natives to catch other fish, and in one locality, where there is a citrate factory, I have seen them swarm in thousands, fighting over the refuse lime seeds thrown out as waste from the mill.

It was always best to use a long line with the bait hanging within a few inches of the bottom. The usual procedure of the fish was to nibble feebly for a few moments and then strike and strike hard. Sometimes they would strike without any preliminary warning.

As a game fish the Perai is not one that will, except for a few moments, delight the heart of the angler. After the first few rushes the fight is over and the fish comes quietly to the surface. The fisherman must be careful to keep a taut line, for, at the slightest slackening, away goes the quarry; he must strike hard to make fast the hook for the perai has a mouth of bone, against which the point of the hook often turns

as if made of lead, or snaps off like the head of a match struck too hard against the box. A strong wire leader must be used. Even, then, I have seen the villainous teeth click together on a heavy piece of phosphor-bronze wire and, as easily as a pair of wire nippers, snap it in two.

The fish in the boat is nearly as bad as in the water. One must be very careful not to place any portion of his anatomy too near, or, with a flop, the perai will seize it. He seems to use a certain amount of cunning. If a finger touches his body

he will not make a motion until it is within reach of his jaws. Then, with a twist or turn, he snaps, bringing his teeth together with a sharp click, and it goes hard with the finger that is between them.

The species described above is *Roosevelliella niger*. The accompanying photographs were made by Paul G. Howes from specimens collected by William Beebe at Kalakoon on the Mazaruni River.

#### STRANDED "BLACKFISH."

**D**IRECTOR Paul M. Rae of the Charleston Museum sends a photograph showing several blackfish (*Globicephalus melas*) which were recently stranded at Folly Island Beach, South Carolina.

There were ten of these large porpoises, and the photograph shows how close together some of them were cast on the beach.

It is possible that these represent the southern blackfish (*G. brachyptera*), but this cannot be determined from the photograph.

All are lying on their sides. The two in the foreground have their heads toward each other.

The blackfish has from time immemorial been the object of an important fishery in the Faroe Islands. It attains a length of about fifteen feet.

#### SHARK SUCKERS.

**T**HERE are several specimens of the shark sucker (*Echeneis naucrates*) in the Aquarium, the larger of which have been there two years. Two are quite young, being only

seven inches in length. These fishes are distributed among the tanks containing dog sharks, to which they may be seen clinging in characteristic fashion. When there are no fishes present to which they may cling, they attach the head disc to the walls and glass fronts of the tanks, or even turn over and attach upside down to the tank bottom. The appearance of the cephalic disc is well shown in the accompanying photograph of the fish clinging to glass. In the photograph of the two nurse sharks, the small fishes present are shark suckers.

#### FEEDING HABITS OF THE STURGEON.

By W. I. DeNyse.

**T**HE sturgeon (*Acipenser sturio*), is one of the largest food fishes caught in our waters, and sometimes reaches a weight of 500 pounds and a length of 10 feet. Its food consists of mollusks, crustaceans, and algae, and sometimes small bottom fishes are found in its stomach.

Its method of feeding is unique. Underneath the snout, and near the point of it, are four barbels about two and one-half inches long, placed about three-quarters of an inch apart across the snout. It swims with the snout close to the bottom, allowing the barbels to trail along on the sand or mud.

Whenever these barbels touch the protruding siphons of the soft shelled clam or razor clam, the siphons of the clams contract, and by doing so, notify the sturgeon of their presence. It halts, and with its telescope mouth pumps the sand or mud away from the clam, passing it out of the gill openings, and finally drawing the clam from its home in the sand or mud up into the jaws where it is crushed. The larger portions of shells are discarded through the gill openings. If the clams are small, very little of the shell is discarded, all going into the stomach.

Another way the sturgeon has of feeding is to plough a furrow through the sand or mud with its long pointed snout, then turning around and going back through the furrow, it picks up small mollusks and crustaceans it has thus exposed. The sturgeon also will suck up with its protruding mouth great quantities of sand and mud, sifting it through the gills, and by so doing finds many small organisms upon which it feeds.

*The Tilefish in the Markets*—The United States Bureau of Fisheries reports the quantity and value of tilefish landed at the port of New



Photograph by Elwin R. Sanborn

SHARK SUCKER CLINGING TO GLASS

York during the months of August and September at 2,400,000 pounds, valued at \$80,590. The price per pound ranged from two to six cents.



Photograph by Elwin R. Sanborn

## SHARK SUCKERS ON NURSE SHARK

## THE ARMADILLO OR PILL-BUG.

*A Favorite Food of Frog and Salamander.*

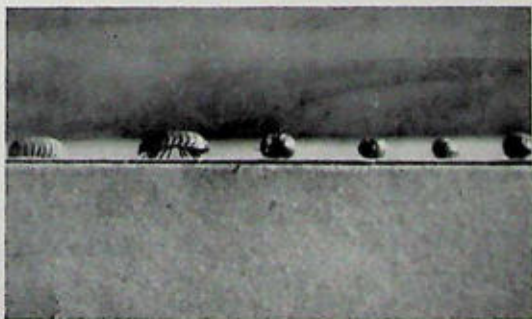
By IDA M. MELLENS.

THE *Armadillidium*, commonly called "armadillo," "pill-bug" and "sow-bug," is often seen near country roadsides and in the woods, especially in the vicinity of fresh or salt water.

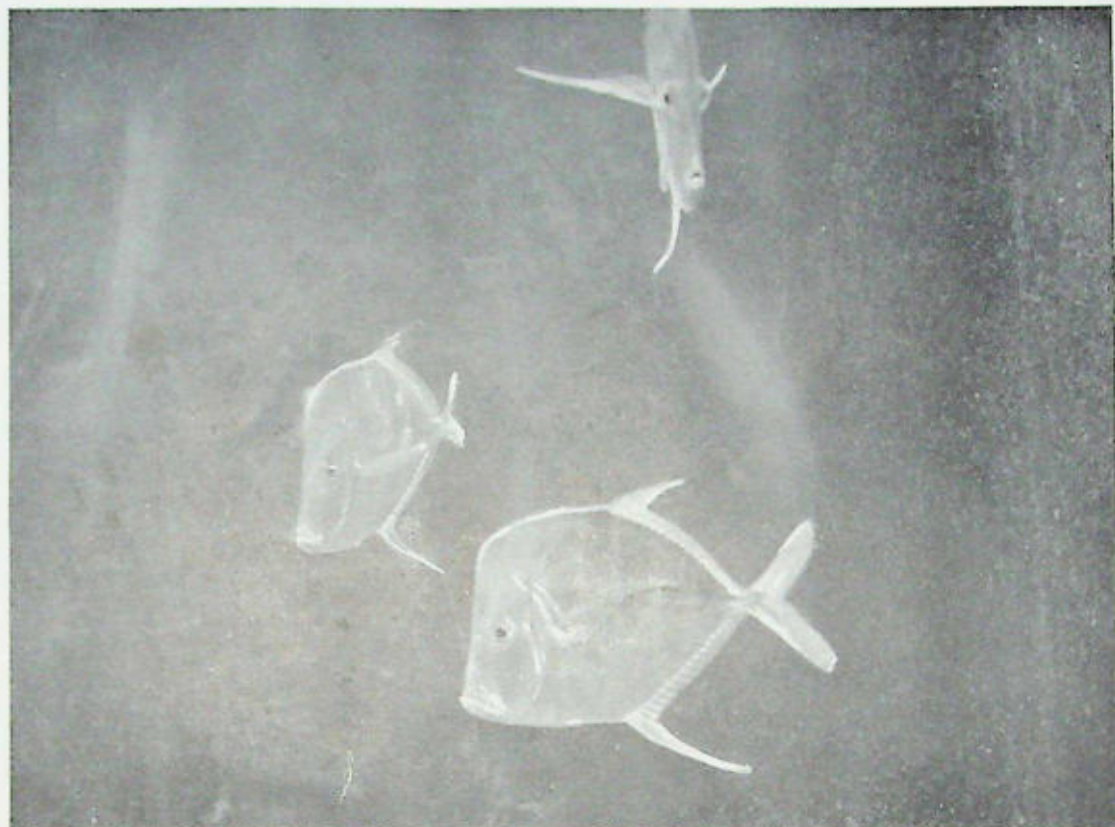
Far from being a "bug," it is a unique crustacean, an isopod of the genus *Oniscoidea*, which exhibits odd and interesting adaptations of a water animal to land life. Like all true crustacea, it possesses gills; but they are leaf-like and curiously fitted for breathing air. These strange gills, enclosed beneath the abdomen, are provided with air-tubes not unlike the air-tubes through which insects breathe all over their bodies. The young do not pass through the usual crustacean metamorphosis, but are hatched in the form of the adult.

The pill-bug (*Armadillidium vulgare*) pursues the tenor of its way—an even enough tenor when there are no frogs, toads, or salamanders about—on seven substantial pairs of legs. Found in damp places, and under stones, boards and roots, it is said by some to be a useful little scavenger, subsisting largely on decaying vegetable matter. Others declare that it destroys the roots of plants.

The name "armadillo" was given it by reason of its habit of rolling itself up into a ball when disturbed, in apparent imitation of that luckless creature of the South, the armadillo. The latter, in the possession of its bony, outer skeleton, in which it encloses itself for protection, is no less unique among mammals than is its small namesake among crustacea. But the crustacean is, in this case, shrewder than the mammal; for, whereas the armadillo will allow itself to be very roughly treated rather than uncoil,—and its shell serves for its own roasting pan in the ovens of Southern epicures,—the pill-bug, after rolling itself up once or twice and discovering that the enemy is still in pursuit, will abandon the useless trick and seek to escape.



ARMADILLO OR PILL-BUG.



Photograph by Elwin R. Sanborn

MOONFISH (*SELENE VOMER*)

THE MOON FISH (*SELENE VOMER*).

**T**HIS silvery creature always attracts attention in the Aquarium on account of its vertically lengthened head and remarkable thinness. It is so flattened laterally that a specimen eight inches long and six inches high, may be not more than half an inch thick.

The species is found along our coast in summer and three specimens are now in the Aquarium. It reaches a weight of two pounds, but is not of much value as a food fish. The accompanying photograph suggests its pearly or silvery appearance quite well.

MORE ROOM FOR THE SEA LION.

**T**HE large California sea lion which has lived in one of the floor pools in the Aquarium for nine years, has been moved to the large central pool, having outgrown his old quarters.

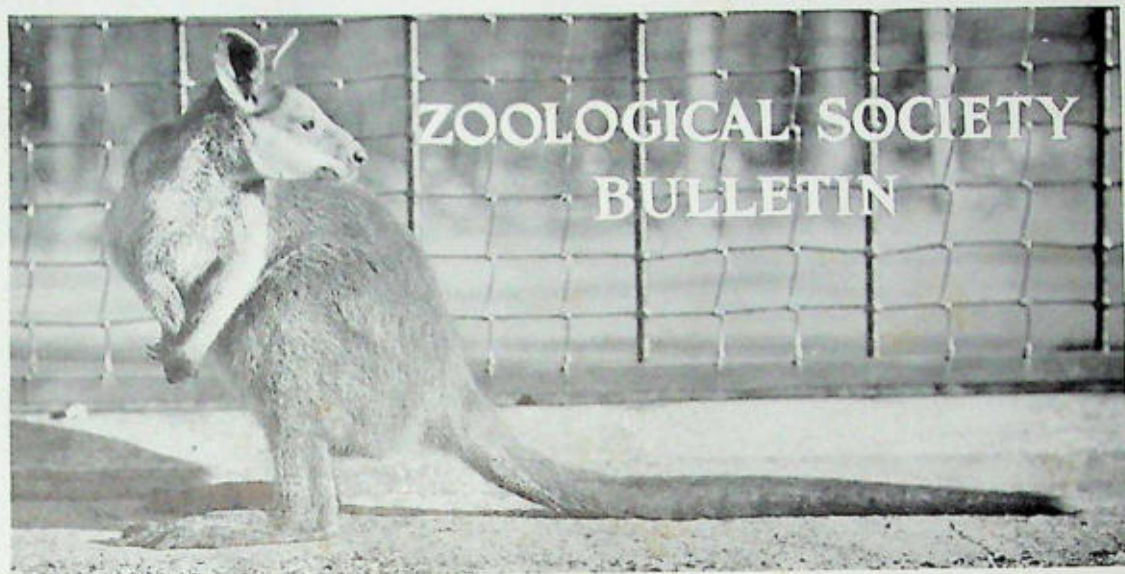
This active animal has taken full advantage of the ample swimming space afforded in the larger pool and goes merrily all day, sometimes indulging in lively porpoise leaps.

He was purchased in October, 1907, when

about two years old. When moved to the large pool, in August, 1916, his actual weight was found to be 620 pounds.

*Excellent Photography at the Aquarium.*—The full-page photographs reproduced in this BULLETIN are each the result of flashlight work by Mr. E. R. Sanborn. The frontispiece, showing groupers and jewfish, could hardly be improved upon as a photograph of objects under water and behind plate glass. The difficulty arising from the reflection of objects behind the camera has been successfully met. Other equally good views of the exhibits of the Aquarium are ready for future numbers of the BULLETIN.

Mr. Chapman Grant, late of the Aquarium staff, has re-entered the regular army, having been commissioned First Lieutenant in the Seventeenth United States Cavalry, now at El Paso, Texas. Mr. Grant rendered excellent service to the Aquarium during the summer, in connection with the work of enlarging certain exhibition tanks, as described elsewhere in this BULLETIN.



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WOMBAT AND HER BABY  
Specimens recently received from Australia by the Society.

# ZOOLOGICAL SOCIETY BULLETIN

*Published by the New York Zoological Society*

Vol. XX

JANUARY, 1917

NUMBER 1

## THE ALLIGATORS OF GEORGETOWN

*By* WILLIAM BEEBE

**F**LOATING branches and logs are a common sight on the waters of the creeks and rivers of Guiana, and about one in every three of these logs is an alligator. Common in many places and actually abundant in a few, these great saurians are far less conspicuous than their infinitely smaller relatives—the lizards which everywhere scamper up tree-trunks or barge clumsily through the fallen leaves. Several negroes in Georgetown make a living collecting and stuffing young alligators and one man who had constantly followed this line of work for twenty years had acquired a very thorough knowledge of the ways of life of these giant reptiles. Among the natives generally, they are feared and avoided, and are (mistakenly) accredited with great longevity, of one or two hundred years.

Caimans or crocodiles are not found on the coast, and in fact live only above the first falls or rapids on the rivers whence mythical giant crocodiles are occasionally reported by the Indians.

Alligators occur in most of the rivers, creeks and even trenches along the coast, and nests are found in Georgetown itself, about a hundred eggs being gathered in the Botanical Gardens each season. The female alligators when full grown measure from three and a half to five feet, while the males, in exceptional cases, attain a length of nine feet.

The actual nesting season begins in May and reaches its height in June. Nests and eggs are still to be found in lessening numbers in July and August, but no eggs have been taken either in April or September. The number laid by each

female varies from twenty to forty, each weighing about three ounces. They require at least seventy-five days to hatch. The little 'gators are about eight inches long, a whole inch of which is gained within a few hours after breaking the shell.

Three weeks before actual laying commences, the female alligator gathers together a pile of water-soaked or decayed vegetation, pulling it up and carrying it in her mouth to some secluded spot on the bank of a trench or creek. Here she piles it and mats it down rather firmly in a rough heap about two feet in height. When alligators have been much bothered or persecuted, they will often select a pegass trench and make their nest on the floating vegetation in the center, out of the reach of any passing native.

When several weeks have passed, she tears the nest open and lays her eggs in the center of the hot steaming mass. Unlike the turtles which lay their eggs in the sand banks of the neighboring rivers, she does not desert the nest, but remains most of the day somewhere in the vicinity. She does not feed there, however, but daily swims to some more distant place. Her food consists of fish, frogs and snakes, with whatever small animals or birds can be captured, while dead creatures and even carrion are eaten without hesitation. If the feeding ground is at a considerable distance it is an easy matter to open the nest and examine the eggs undetected, but if the alligator does not have to go far, she will return at the slightest sound.



A TUBFUL OF BABY ALLIGATORS  
Waiting to be stuffed.

Alligators differ considerably in their courage. Some will leave the nest after a few weak protests, while others will obstinately remain sprawled over their precious rubbish heap and have to be killed before their nest can be robbed. The mother alligator remains faithfully at her post until the time of hatching, in which process she gives material assistance. The two and a half months of alternate drenching and baking by rain and sun often cakes the nest mound with a hard-baked crust through which the gatorlings would find it impossible to force their way. So the parent bites into the nest, tossing the outer shell to one side until the pipped eggs or the newly hatched young are exposed. When this is done she rolls out the pipped eggs and pressing upon them with one of her front feet, she cracks them and liberates the young 'gator. The eggs which are still whole she rolls back among the debris and leaves until the low, nasal, squeaking grunts announce that more are ready to emerge. The young are able to hatch by themselves, but it is usually a very long operation and many die in the shells.

I examined one which had had his little pug-nosed snout thrust through the end of the shell for twenty-four hours and was just about to break a bit away from the hole when the little reptile shot forth like a jack-in-the-box, freeing himself completely except for his tail. He sprang from my hands into a basin of water, where he dived and swam frantically, the banging of the tail-suspended shell against the tin frightening the newly hatched reptile, and conveying a first impression of the world as a fearsome, undesirable place. He blinked, rose to the surface, shook off the egg shell, and turn-

ing sideways snapped at a spot of sunlight. For a day and night, the past twenty-four hours, only the snout had projected. In three seconds more the whole being of the perfect gatorling was functioning, fully launched on what would normally be a long and checkered career.

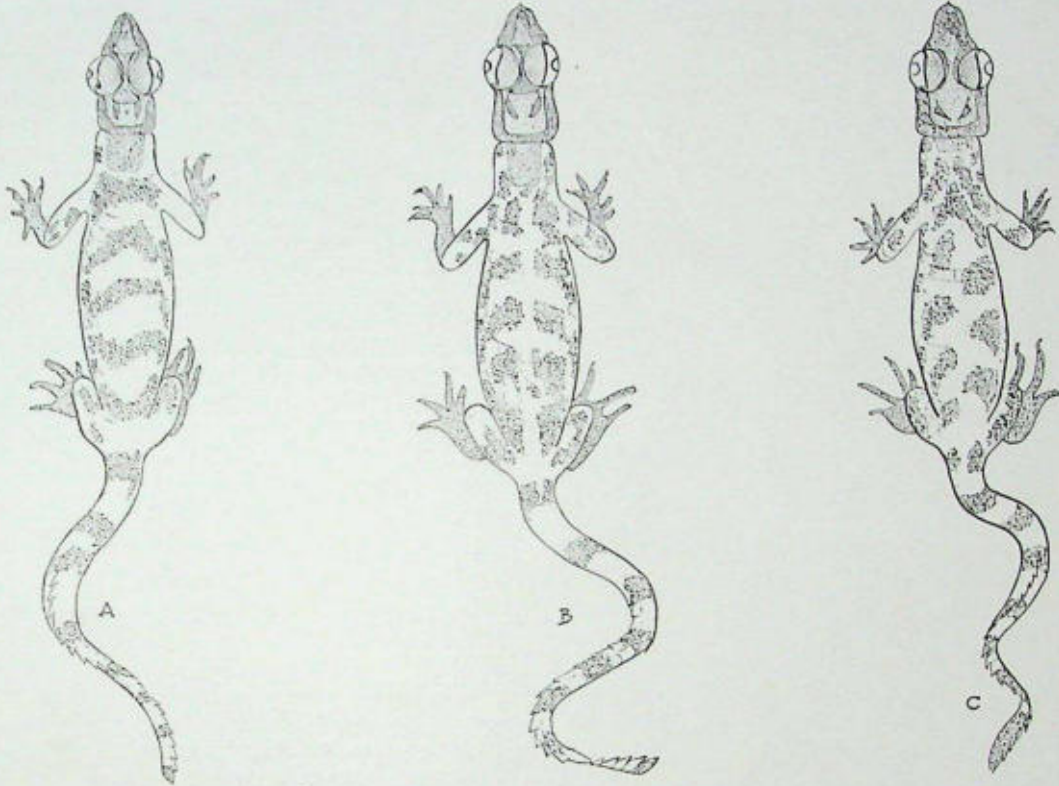
The mother alligator goes to the nests with the young, and while some swim away and are lost, or forage for themselves, yet many female 'gators are seen at other times of the year accompanied by small ones of two distinct sizes, which the hunters believe are the remnants of the breeds of the two past years, still more or less attendant upon her.

The watchfulness of the parent is of course a trait inherited through long past centuries, and is in no way consequent upon the very recent, desultory robbing of the nests by man. But it is curious that their worst enemy at present is that most terrible pest introduced by man from India, the mongoose. The only autochthonous foe is the big tegu known locally as salimpenta. Both of these enemies wait until the parent alligator has gone away and then dig their way down to the eggs. The big yellow-tailed snake has been seen trying to force its way through the crust of the rubbish, but in vain.

The mating season begins in April and is announced by the females calling the males. The proportions of sexes is very unequal, there being twenty or more females to every male. The cry of the female is a subdued but very strong and penetrating grunt, often repeated. The male's voice is a bellowing or roaring, and when this is heard in the trench, every female within hearing rushes toward him, ten or fifteen



AT THE HEIGHT OF THEIR CAREER  
After being stuffed.



From a pen drawing by John Tee Van

NEWLY-HATCHED ALLIGATORS FROM THE COASTLANDS OF BRITISH GUIANA

Showing the three alleged forms: A. Goosway; B. Abary; C. Goomasaka.

sometimes surrounding him at once. After mating, each goes off to her respective nest, where she deposits the entire number of eggs at one laying, afterwards covering them carefully.

The male never goes near the nest, except under very unusual circumstances, and it is in this connection that my alligator hunter indulged his belief in a romantic yarn, which he was convinced was true. I recount it rather as a pleasant bit of negro imagination, than as an addition to reptilian psychology. My hunter said that now and then he came across maimed and crippled females which yet had well-built nests full of eggs. One such was an animal which had three feet bitten off, leaving only one hind leg. She could not get up the trench bank without support, and yet her nest was on the top. After trapping her, the hunter concealed himself and called, and was surprised to be answered by a big seven foot bull-gator which came out of the water to the nest. In this and several other instances, so my hunter argued, the male must have built the nest, as well as helping the female to get out of the water whenever she returned to it.

When an alligator is trapped or caught in the hand it utters loud chirping squeaks, not unlike the distress cries of some birds. By imitating this, all the alligators within hearing will answer and approach, most of them being females, with now and then an occasional male.

Every season my alligator hunter collects more than three thousand eggs, of which sometimes only about eight hundred hatch. In every gator's nest there are always a number of infertile eggs, ranging from five to twenty per cent. In a six weeks' nest, these can already be detected and thrown away, but in a nest where the eggs have been deposited only three weeks, the fertile cannot be told from the infertile ones. The fertile eggs remain white but the bad ones soon turn yellow, at first in spots and later all over. In a healthy egg with a four weeks' embryo, the two end thirds of the egg are pale pink or flesh color. The surface of some eggs is almost smooth, but usually the lime incrustations resemble the convolutions of brain coral.

The hunters recognize three kinds of alligators, both young and adults of which they can distinguish on sight. These are known respect-

ively as the Abary, the Goosway and the Goomasaka. The principal distinguishing characters between the three are the black dorsal markings. Between the front and hind legs there are four, rarely five, transverse black bands. In the Abary most of these bands are interrupted in the middle line of the back; in the Goosway, they form solid, continuous transverse zones of pigment; while in the Goomasaka, the bands on each side of the back line alternate, the lateral halves of one side being opposite the lighter interspace of the opposite side. Every individual gator of any one brood always conforms to one or the other of the types, but breeds of intermediate types are occasionally found, and these are considered as the result of interbreeding of two of the forms.

The Abary and Goosway are the common forms and found over most of the coastal area, while the Goomasaka is very much rarer and confined chiefly to Berbice. These are also reputed much fiercer than the others, more ready to attack any intruder, and to be able to stay for a much longer time under the water. When adult there are four long teeth in the lower jaw which project through the bone and skin of the upper. The Abary and Goosway on the contrary, have teeth which are much more even.

Few living alligators are sold. The eggs are gathered, sorted as to degree of development, and kept until hatched in boxes filled with vegetable debris. The alligators are confined in tubs of water and within a day or two are killed and stuffed, standing in absurd postures, erect on their hind legs. Forever after they gaze through shoebutton eyes, and hold their little fore arms stiffly out to receive the card tray for which their future destiny intends them. Tourists, with unbelievable eagerness, purchase these atrocities at a shilling each, doubtless to repose beside wax flowers or to share some dusty northern shelf with a conch shell or a sandalwood box. In spite of this the 'gators of Guiana are holding their own. The toll of infants to be metamorphosed into ornaments is less hurtful to the race than the sacrificing of the skins of the adults for satchels.

#### THE OVAL ANT FROG

By RICHARD DECKERT,  
Department of Reptiles.

THE Reptile House in the Zoological Park harbors many interesting creatures, especially among the amphibians, which the average visitor scarcely honors with a casual

glance, or, owing to their burrowing and nocturnal habits, does not see at all.

It is the purpose of the writer to direct the attention of the readers of the BULLETIN to some of the peculiar habits of these strange members of an order of vertebrates that is little known, and in consequence is but slightly appreciated.

All of these creatures are insectivorous, and many, like the common toad, are of great use to man. A little enlightenment, therefore, regarding their modes of life and their appearance should be desirable, if it were only to serve the purpose of doing away with age-long superstition and prejudice against these harmless members of the animal kingdom.

Every one with a mental picture of the outline of a frog expects when such a creature is mentioned to behold an animal with short, squat body, long limbs, large, wide head and proportionately large eyes. The Ant Frogs, however, are quite different in structure. The body is large and oval, the legs are short in proportion, and the head is very small, with a sharply-pointed snout, small mouth and tiny, bead-like eyes.

These characteristics in frogs always denote nocturnal, burrowing and ant-eating habits. The mouth, instead of possessing the regular dentition along the edges of the upper jaw as in true frogs, has several curved, transverse ridges on the palate, which are faintly serrated, but do not bear teeth. This peculiar structure is usually associated with a diet of ants.

The habitat of these frogs, which are also called narrow-mouth frogs, is southern North America, Mexico, Central and South America, southern Asia and many of the islands in the Pacific and Indian Oceans, Australia and Africa. The three known North American species inhabit most of the states south of Virginia. They are dull of color, usually some shade of gray or brown.

The Oval Ant frog (*Engystoma ovale*) is a native of South America, the specimens in the Reptile House having been collected on the Island of Trinidad, off the coast of Venezuela. They are small, the adult frog attaining a length of but one and one-eighth inches. Over the neck region there is a distinct transverse fold of skin, giving a turtle-like appearance. The color is leaden gray, with minute black specks on all the upper surfaces, while the abdomen bears a pattern of large and small bright yellow spots of irregular shape, interspaced with black. On the inner side of the



A GIANT BUTTRESSED MORA TREE

Scene in the Tropical forests of British Guiana. From a photograph by Paul G. Howes.

thigh there is a broad orange or vermilion band, from groin to knee; concealed except when the frog is in motion.

The tropics of both the Old and the New World have many species of frogs, plainly colored above, but with bright yellow, red or orange on the parts not seen when the frog is at rest. What the reason may be for this conspicuous and ordinarily concealed coloration has not been determined, although some writers claim that for some species it serves as a warning to predacious animals.

During the day the specimens exhibited in our Reptile House conceal themselves under pieces of bark, but after dark they come forth and prowl around their cage in search for food. This is procured for them in the following manner: Small pieces of wet bread or raw beef are deposited in corners known to be infested with black ants, and are left there until they are covered with those insects. The ant-covered bread or meat is then placed in the vivarium with the frogs which soon emerge from their hiding places, and slowly crawling, instead of hopping like ordinary frogs, approach the "bait," when the feast of ants begins. An almost incredible number of ants can be assimilated by one of these tiny frogs. Small flies, which I had tried to feed to them in the beginning of their captivity were not eaten, the frogs taking no notice of them, and thus it seems that their diet consists exclusively of ants.

#### BREEDING BIRDS.

##### RESULTS DURING 1916 IN THE PARK.

By LEE S. CRANDALL,  
*Assistant Curator of Birds.*

**C**LIMATIC conditions during the spring and summer of 1916 were decidedly adverse to the successful rearing of birds in captivity, and throughout the Eastern states, at least, unsatisfactory results have been general. The collections in the Zoological Park were not exempt, and a rather depressing list of disappointments is no more than balanced by the few successes. Severe snow storms and continuous low temperatures during February and March, followed by interminable cold rains, were enough to discourage even the most persistent of prospective avian parents.

The devotedness of the male emu to his offspring of 1915, caused him to ignore his mate entirely this year, until after the breeding season had passed. As the normal laying time approached, and the birds gave no indications of



EMU CHICK

mating, we realized the situation, and separated the too-fond parent from the cumbersome chick. Both birds, however, strenuously objected, and when the male finally became reconciled to the change, there was no hope of breeding.

The seasonal balance of the *Cereopsis* geese, which year after year have bred regularly, was disturbed by the inclement weather, so that almost as soon as they were placed in their breeding quarters, the birds fell into a heavy molt. This, of course, precluded all possibility of nesting.

Roseate spoonbills, black-headed ibises and snowy egrets, all succeeded in hatching young in the Flying Cage heronry, but in each case the chicks mysteriously disappeared. It is evident that we never shall be able to achieve any satisfactory degree of success with these birds under the present conditions, and we hope that some means may be found for providing a breeding cage in which a few mated pairs may be segregated. There is no reason to doubt that we should then be able to breed many of the birds of this interesting group.

The necessary alterations of the Wild-Fowl Pond, which has now been placed in excellent condition, naturally prevented any breeding among the waterfowl quartered there. We were fortunate, however, in being able to preserve the bulk of this collection in excellent condition through more than a year of vicissitudes. We expect next season to resume our work in the propagation of these birds.

Because of their value as game birds, the many species of wild pigeons have received more

or less attention from propagators. We are particularly glad, therefore, to be able to add to the list of these birds that have been bred in captivity in this country, the picazuro pigeon, (*Columba picazuro*). This is a fine, large species, found in southern South America, and as it is indifferent to the cold, it might be introduced with success in northern countries.

Our breeding pair came to us from Brazil in January, 1910, and since that time they have been kept in one of the runs at the Pheasant Aviary, living out of doors throughout the year. For six years, they gave no evidence of a desire to nest, although facilities were always provided. This spring, however, they appeared to have become thoroughly reconciled to captivity, and after several futile attempts succeeded in hatching and rearing a young bird. They are now again engaged in incubation. But one egg has been laid in each case, and it is probable that this is the normal clutch with this species, as it is with most of the larger pigeons.

A pair of engagingly tame red-billed pigeons (*C. flavirostris*), from Mexico, are nesting, and, like the picazueros, have but a single egg. These birds are favorite pets of the Mexicans, and the squabs often are taken from the nest and reared by hand. Such birds retain their lack of fear, even when adult, and if a true pair can be obtained, will breed freely.

The mourning doves, that have absorbed a good share of our attention, have reared more than twenty youngsters. Several of these birds killed themselves by dashing about their cages when alarmed by an escaped ring-tailed "cat," but enough remain to provide a good stock of breeders for next year. A pair of adults is now at liberty in the Park, the male having been free for more than a year.

In 1914, a pair of laughing gulls hatched two young ones in the Flying Cage, and in spite of the ever-ready maws of pelicans and herons, succeeded in rearing one of them. The following year, two pairs made the attempt, but in spite of a hedge of branches which was placed around them, all of the young disappeared. Early this spring, large stones were arranged to form tunnels in which each pair could find seclusion. The pile was then surrounded by a circle of heavy wire netting, six feet high and eight feet in diameter. Numerous small apertures were cut at the bottom, large enough to admit the gulls, but excluding everything larger.

The birds did not enter the sanctuary at first, although they evidently desired to do so. It was then noticed that the entrance holes were of such a height that it was necessary for the

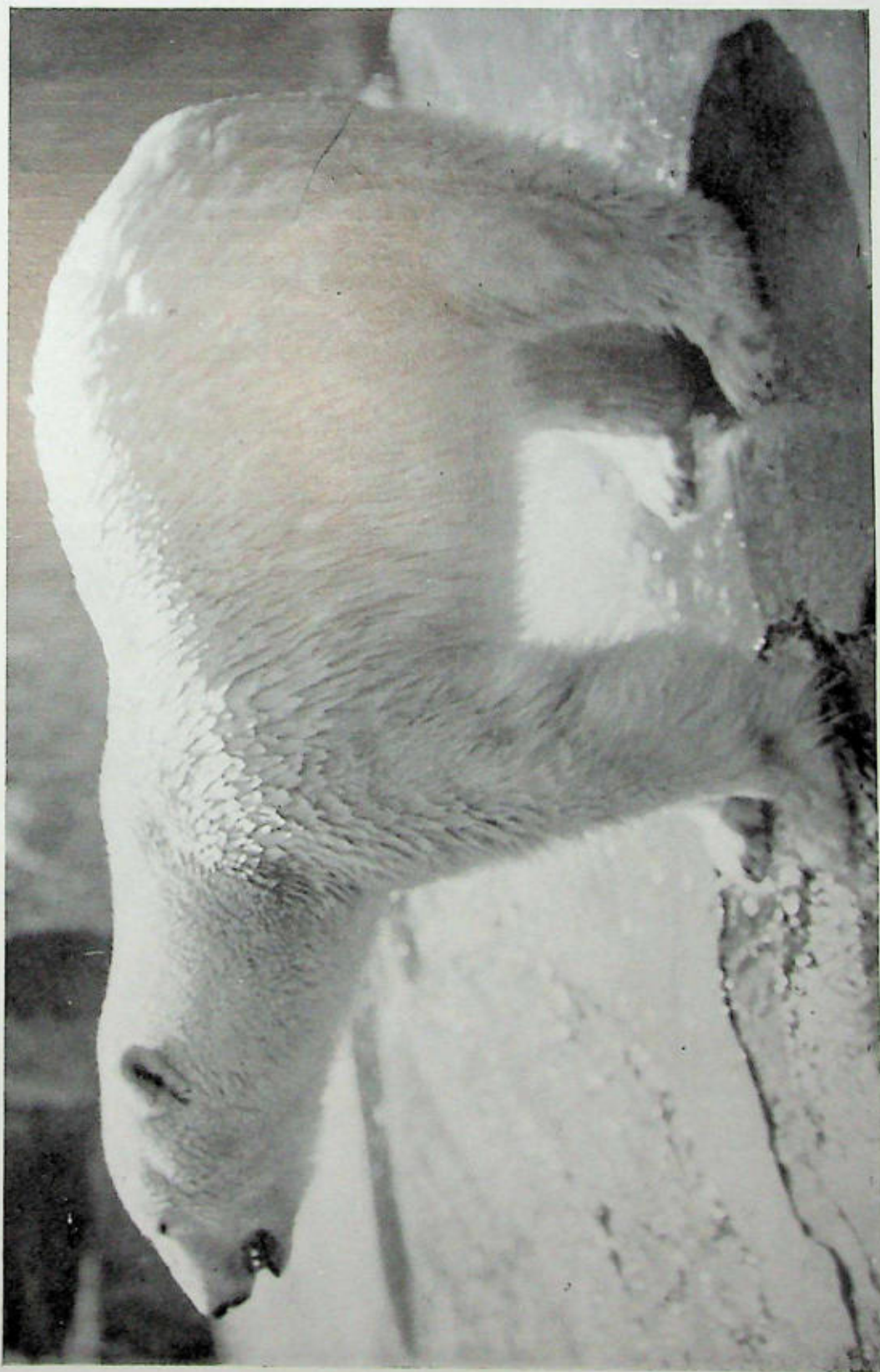
gulls to lower their heads in order to pass through. As this is an act which many wild birds consistently refuse to perform, two inches were clipped from the top of each space, and next morning the gulls were inside.

Three pairs immediately selected sites and soon were incubating their eggs. Each pair safely hatched a single youngster and all were doing well, when one was killed by a large rat. This depredator received swift justice, and the remaining two young birds were safely reared.

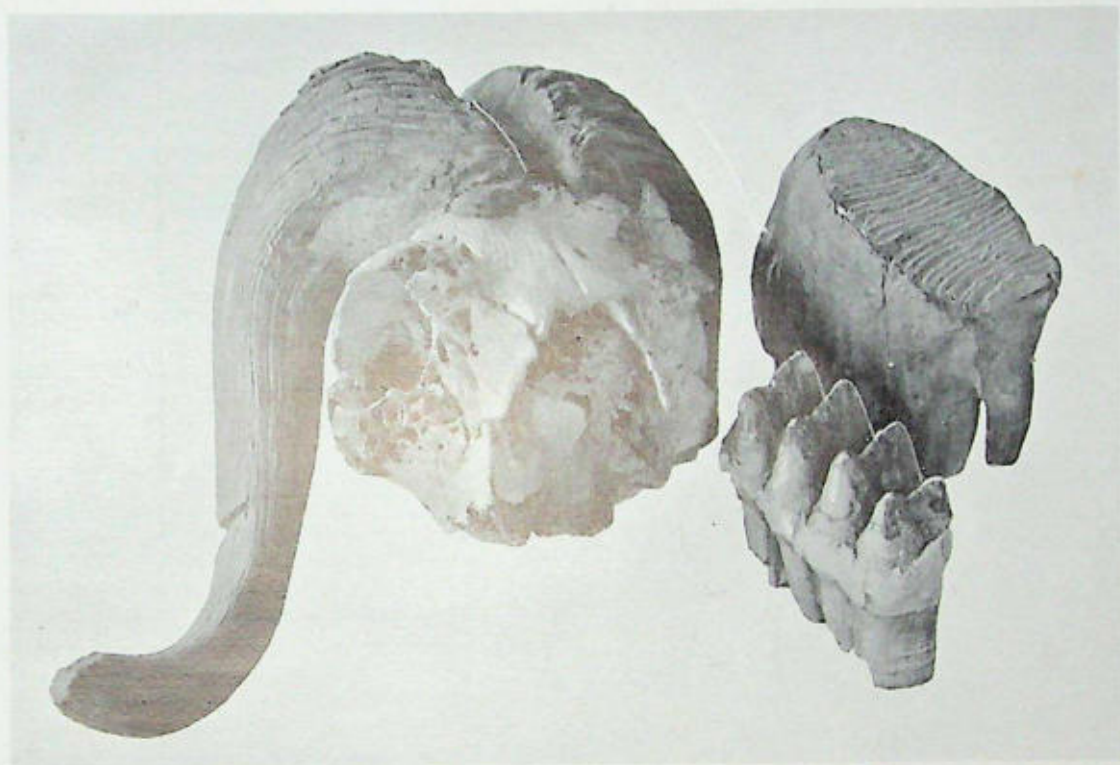
We have reared a number of golden pheasants, several bob-whites and also at least one scaled quail, with several more still in the bumble-bee stage. The last species may have been bred previously, but no record of this event has come to the writer's notice.

Last year, while removing the birds from the Flying Cage, we found two large white eggs in a small cavity in the top of a ten-foot stump. They evidently were those of curassows, and this spring we selected the only true pair that had been in the cage the year before, and withheld the others. A close watch soon disclosed the female sitting in the cavity, and after a short wait, her two white eggs were removed and placed under a bantam hen, since young birds of that character could not survive in the midst of such a crowd of doubtful characters as is found in the Flying Cage. Unfortunately, however, the eggs proved infertile, as was the case with a second pair which appeared shortly afterward. This species, the banded curassow, (*Crax fasciolata*), appears never to have been bred in captivity, and it is disappointing to have been so near success without achieving it.

*A Reckless Peafowl.*—There is no accounting for the tastes of people, as the old proverb says, and this is equally true of wild creatures. When Mr. Charles Snyder prepared the fang of a rattlesnake to present to a friend, he did not suspect its ultimate destination. It required considerable delicate manipulation to separate the fang from the skull and properly clean it, and after this had been accomplished Mr. Snyder placed it on a window ledge of the Reptile House to dry. The peacocks have a habit of perching on these window ledges to bask in the sun, and one of them passing at this moment, selected that same ledge and settled himself down. Then discovering what he suspected to be a delicate morsel, he seized it, raised his head in the air, after the manner of a fowl, and swallowed it. The rightful owner passing across the yard, saw the act of the peacock, too late to save the fang.



OUR MALE POLAR BEAR, SILVER KING  
The bear has just left his swimming pool and the water is freezing on his hair.



THREE RARE SPECIMENS FROM ALASKA

Skull of musk-ox, and fossil teeth of mammoth and mastodon. The smaller tooth is that of the mastodon.

### THREE RARE SPECIMENS FROM ALASKA.

THE SOCIETY'S esteemed correspondent at the most northerly point of Alaska, Mr. Charles D. Brower, has again contributed substantially to our knowledge of the mammalian life that inhabited that region in prehistoric times. In BULLETIN No. 45 (May, 1911), we published a letter from Mr. Brower, proving the existence of the Barren Ground musk-ox as far west as the longitude of Point Barrow, within comparatively recent years. A little later on, Mr. Brower sent to the Society a musk-ox horn, and a piece of musk-ox skin covered with hair.

In 1915 Mr. Brower sent to the Zoological Park collection of Heads and Horns, a mastodon tooth in an excellent state of preservation, from the Kooloogama River, about ninety miles southeast of Point Barrow. It is so fresh and recent that it appears to be post-glacial.

In December, 1916, the Society received from Mr. Brower another gift consisting of a musk-ox skull, and a mammoth tooth of large pro-

portions, very well preserved. The latter was found in the same locality that produced the mastodon molar, proving that the mammoth and mastodon lived at the northern limit of land in Alaska practically at the same period of geologic time. We are in the habit of thinking of the mastodon as an animal of the United States, and not of the far north, and it requires an effort of the imagination to locate it in the frozen north, on the shore of the polar sea, beside the great hairy mammoth, who was quite at home in the abode of snow and ice.

The musk-ox skull is quite as fresh-looking as any of the American bison skulls that still are found at rare intervals in the western bad lands, foothills, and even upon some of the mountains bordering the Great Plains. Its lower jaw is missing, but the horns are intact save for one tip that has been sawn off with a very blunt instrument. The operator made a start toward sawing off the terminal half of the other horn, but changed his mind and his work, very opportunely for our specimen.

This skull appears to have been weathering for not more than thirty years.—*W. T. H.*

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**ZOOLOGICAL SOCIETY BULLETIN**


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**Departments:**

<i>Mammals</i>	<i>Aquarium</i>
W. T. HORNADAY.	C. H. TOWNSEND.
<i>Birds</i>	<i>Reptiles</i>
WILLIAM BERNE.	RAYMOND L. DITMARS.
LEE S. CRANDALL.	

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Published bi-monthly at the Office of the Society,  
111 Broadway, New York City.

Yearly by Mail, \$1.00.

MAILED FREE TO MEMBERS.

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Each author is responsible for the scientific accuracy  
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ELWIN R. SANBORN,

*Editor and Official Photographer*

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VOL. XX, No. 1

JANUARY, 1917

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**H. CASIMIR DE RHAM.**


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We announce with great sorrow, the death of one of the Society's most valued members and staunch supporters, H. Casimir de Rham, who passed away on December 15, 1916. Mr. de Rham was an Associate Founder and had been a member of the Board of Managers since 1899. He devoted his whole energy to the work of the Society in its various fields, and it was greatly due to his efforts that the Heads and Horns Collection at the Park developed into a permanent exhibit.

**DISAPPEARANCE OF RUFFED GROUSE  
IN NEW YORK**

Until about two months ago the great majority of the sportsmen and game protectors of the State of New York had rested confidently in the belief that the four-bird bag limit law on ruffed grouse, and the difficulty found in shooting the birds in brush and timber, had really been saving the ruffed grouse species on a continuing basis. Very suddenly, and most unexpectedly, the fallacy of this belief was revealed during November, 1916; and today the sportsmen of New York are in a state bordering upon consternation.

One remedy for this deplorable decrease of our finest upland game bird will be found in giving it immediately a six-year close season. This can be accomplished by petition to the State Conservation Commissioner, Mr. George D. Pratt. It goes without saying that such a petition should cover the entire state. The law provides that on the petition of a satisfactory

number of citizens for a long closed season for any species of game, or for wild life threatened with extermination, the Commissioner may hold hearings in order to ascertain the facts, and then, if conditions warrant it, he may close any district for any species that it may contain. This method is much more simple and possible of accomplishment than an appeal to the legislature for a special act.

The previous State Game Commission was averse to granting close seasons in this way, but it is believed that Commissioner Pratt will view the matter differently.

W. T. H.

**A GREAT "DRIVE" FOR BIRD  
PROTECTION.**

The furious destruction of all killable game still continues, and the struggles that the conservationists are making to save as much as possible from annihilation each year partake more and more of the methods of practical warfare. For example, the Permanent Wild Life Protection Fund and the Stokes' Bird Fund of the Zoological Society now are making literally a "great drive," covering eighteen of the states west of the Mississippi River, designed to save from extermination and bring back the sage grouse, other species of grouse, and the quail.

At the same time, this is also an effort to save legitimate sport from becoming an extinct pastime, and to protect the rights of the small sons of today and the grandsons of the future.

On account of the rapid increase of destructive agencies, and laws that are fatally liberal to hunters, the upland game birds of all North America are fast disappearing. Particularly is this true in the West, where good roads and automobiles now carry loads of gunners into every locality wherein grouse and quail still may be found. Usually the hunters are armed with the deadly pump and automatic guns. Dr. Hornaday estimates that already automobiles and good roads have increased the perils of upland game birds by 300 per cent; and New York and North Dakota have prohibited the use of automobiles in hunting.

In the hope of arousing the legislatures and the people of at least some of the western states to the point of effective action, Dr. Hornaday has written, and the Permanent Fund has published, 10,500 copies of an illustrated bulletin of forty-eight pages entitled "Save the Sage Grouse from Extinction: A Demand from Civilization to the Western States." The text covers all the grouse, ptarmigan and quail of the West,

but the case of the sage grouse is taken as a special text. The tragic fate of the Eastern pinnated grouse, or heath hen, is held up as a fearful example.

This drive is made now for the reason that the legislatures of all those western states convene for their biennial sessions next January.

Coincident with the issue of BULLETIN No. 5, there was sent to Texas 2,500 copies of a large illustrated poster, showing in most striking fashion how the birds and deer and other game of that state are being slaughtered. With this exhibit a strong demand is made for sweeping reforms. All the illustrations are from Texas sources.

It is to be noted that even a bag limit of four birds per day has not been sufficient to maintain the ruffed grouse of New York on a continuing basis; and now the sportsmen of the state are thoroughly alarmed and are themselves looking for a way to prevent the extinction of their finest game bird.

It would seem that there is only one way to save the upland game birds of America on a continuing basis, and that is by immediately giving all of them six-year close seasons; and if that is not sufficient, carry absolute protection still further. After that, when the birds come back sufficiently to render shooting possible, the open season should be only one week of each year, and the daily bag limit should be two grouse and five quail.

Unfortunately, in thousands of localities, both in the East and the West, the upland game birds are now either gone forever, or else have been shot down to such pitifully small remnants that even with long close seasons they can not recover. In thousands of places, local extinction already is an accomplished fact, and the boys of those localities can learn of their local grouse and quail only by looking at mounted specimens in museums.

NEW MEMBERS.

July 1-December 31, 1916.

LIFE MEMBERS.

Condon, T. G.,	Harkness, Mrs. Edward S.,
duPont, Mrs. Wm. A.,	Harvey, Eli,
	Hepburn, A. Barton.

ANNUAL MEMBERS.

Bliss, Mrs. Walter P.,	Garrard, Miss Margaret H.,
Bowdoin, George Temple,	Halsey, Charles W.,
Boydén, Dwight F.,	Hungerford, Richard S.,
Brengle, Lawrence J.,	Johnson, Gilbert H.,
Chapman, Miss Fanny,	Kellogg, J. Prentice,
Cutting, R. Fulton,	Kennedy, Mrs. H.,
Deane, W. B.,	Rensselaer,
Ewing, Joseph Grant,	Lane, Miss Annie E.,

Lawton, Mrs. James M.,	Reisinger, Curt H.,
Loewi, Dr. Karl J.,	Roberts, Owen F.,
Low, William Gilman, Jr.,	Rodewald, F. L.,
Marekwald, Albert H.,	Roenig, Walter,
Marshall, Mrs. Chauncey,	Saunders, Alfred H.,
Meyer, Eugene, Jr.,	Saunders, Mrs. Virginia,
Miehling, Charles,	Stickels, Edward H.,
Mitchell, John R.,	Tiers, Mrs. Alexander H.,
Palmer, Edgar	Virgin, Dr. Frederic O.,
Proctor, Mrs. Charles E.,	Whitney, Richard.

WILD BIRDS BRED IN CAPTIVITY IN THE UNITED STATES.\*

Compiled by LEE S. CRANDALL,  
Assistant Curator of Birds.

In the BULLETIN for October, 1909, appeared a list of "Wild Birds Bred in Captivity in the Eastern United States," compiled by Mr. Wm. Beebe and the writer. The species then recorded numbered eighty-two, and may be summarized as follows:

Galliformes (Pheasants, etc.).....	26
Columbiformes (Doves and Pigeons).....	9
Lariformes (Gulls).....	1
Gruiiformes (Cranes).....	1
Ardeiformes (Hérons).....	2
Anseriformes (Water-Fowl).....	22
Pelecaniformes (Peleicans and Cormorants).....	1
Accipitriformes (Eagles).....	1
Psittaciformes (Parrots).....	4
Passeriformes (Perching Birds).....	15

Since the publication of the first list, a very considerable number of species have earned a place, and other records not then available have come to light. These are enumerated in the present list. The gratifying growth of interest in aviculture which has occurred during recent years makes it desirable that the record of birds which have been bred successfully be brought up to date. It is very difficult, of course, in the absence of any organized cooperation, to secure all data, and there is no doubt of the omission of some species which should have been included. Any corrections or additions will be received with gratitude by the writer. Precedence has been given, whenever possible, to the first known breeder of each species.

Although the globose curassow and the canvasback duck were included in the previous list, later investigation has shown that in neither case were the young birds fully reared, thus invalidating the records. Since that time, however, both species have been bred, so that they retain their positions, with different authorities.

\*The specimens named in this list are additions to the ones printed in the Zoological Society BULLETIN for October, 1909.



PARRY KANGAROO  
One of the specimens recently received from Australia by the Society.

The breeding of the curassows is of particular interest, because of the possibility of the domestication of the species. It is a strange fact that while curassows become very tame in captivity, it is seldom that they can be induced to breed. Mrs. Thompson's birds laid in 1913, using an artificial nest of sticks, built by Mr. Watts, and placed on the ground. After the two white eggs had been deposited, the male refused to allow his mate to incubate, so the clutch was removed and entrusted to a domestic hen. After twenty-nine days, one egg hatched, the other proving infertile. The young bird was reared without difficulty, being fed much as young pheasants are.

Mr. Rockefeller's canvasbacks, three in number, are the progeny of birds hand-reared in Manitoba. The eggs were incubated and the ducklings reared by a domestic hen, as is customary with wild ducks in captivity.

Following is the list:

	Bred by
<b>STRUTHIONIFORMES</b>	
South African Ostrich	Several
North African Ostrich	Several
<b>CASUARIFORMES</b>	
Emu	Zoo. Park
<b>TINAMIFORMES</b>	
Rufous Tinamou	Rockefeller
<b>GALLIFORMES</b>	
Globose Curassow	Thompson
Temminck Tragopan	Warner
Siamese Fireback Pheasant	Warner
Black-breasted Kalij Pheasant	Kuser
Formosan Pheasant	Zoo. Park
Prince of Wales Pheasant	Worthington
Mongolian Pheasant	Worthington
Elliot Pheasant	Kuser
Common Peacock Pheasant	Kuser
Curacao Crested Quail	Zoo. Park
Colombia Crested Quail	Kuser
Scaled Quail	Zoo. Park
<b>COLUMBIFORMES</b>	
Picazuro Pigeon	Zoo. Park
Cape Dove	Noack
Nicobar Pigeon	Noack
Red-Billed Pigeon	Painter
Bleeding-Heart Pigeon	Rockefeller
<b>RALLIFORMES</b>	
Pectoral Rail	Zoo. Park
<b>SPHENISCIFORMES</b>	
Black-Footed Penguin	Zoo. Park
<b>LALIFORMES</b>	
Laughing Gull	Zoo. Park
<b>GRUCIFORMES</b>	
Paradise Crane	Mackensen
Japanese White-Necked Crane	Zoo. Park
<b>ARDEIFORMES</b>	
Snowy Egret	McIlhenny
<b>ANSERIFORMES</b>	
Cereopsis Goose	Zoo. Park
Egyptian Goose	Kuser
Canvasback Duck	Rockefeller
White-Eyed Duck	Zoo. Park
<b>PELICANTIFORMES</b>	
Brown Pelican	Zoo. Park

<b>PASSERIFORMES</b>	
<b>TURBIDAE</b>	
European Blackbird	Kuser
<b>ARTAMIDAE</b>	
White-Browed Wood Swallow	Painter
<b>FRINGILLIDAE</b>	
Melodious Grassquit	Ibbeken
Yellow-Faced Grassquit	Ibbeken
European Goldfinch	Campini
Mexican House Finch	Zoo. Park
<b>PELOCEIDAE</b>	
Strawberry Finch	Cinc. Zool. Gard.
Long-Tailed Grass Finch	Ibbeken
<b>SCENIDAE</b>	
Black-Headed Myna	Ibbeken
<b>COEVIDAE</b>	
Blue Jay	Cinc. Zool. Gard.

The full names and addresses of the authorities cited above are as follows:

Cincinnati Zoological Gardens	S. A. Stephan, Gen. Manager
Campini, C.	153 East 33rd St., New York
Ibbeken, A. G.	27 West 124th St., New York
Kuser, Colonel Anthony R.	Bernardsville, N. J.
Mackensen, Wm. J.	Yardley, Pa.
McIlhenny, E. A.	Avery Island, La.
New York Zoological Park	Dr. William T. Hornaday, Director
Noack, Harry R.	Oakland, Cal.
Painter, Kenyon V.	Cleveland, Ohio
Rockefeller, William	Tarrytown, N. Y.
	(Arthur M. Barnes in charge)
Thompson, Mrs. Frederick Ferris	Canandaigua, N. Y.
	(E. A. Watts in charge)
Warner, Percy	Nashville, Tenn.
	(Clare Lovett in charge)
Whitman, Prof. C. O.*	Shawnee-on-Delaware, Pa.
Worthington, C. C.	(John McCarthy in charge)

\* Deceased.

## CELTIC AND NORSE HORSES

New Accessions to the Equidæ Collection.

By S. H. CHUBB.

ONE of the greatest sources of satisfaction to the Zoological Society and the staff of the Zoological Park is the superb collection of *Equidæ*, numbering nineteen individuals and representing no less than eight different species.

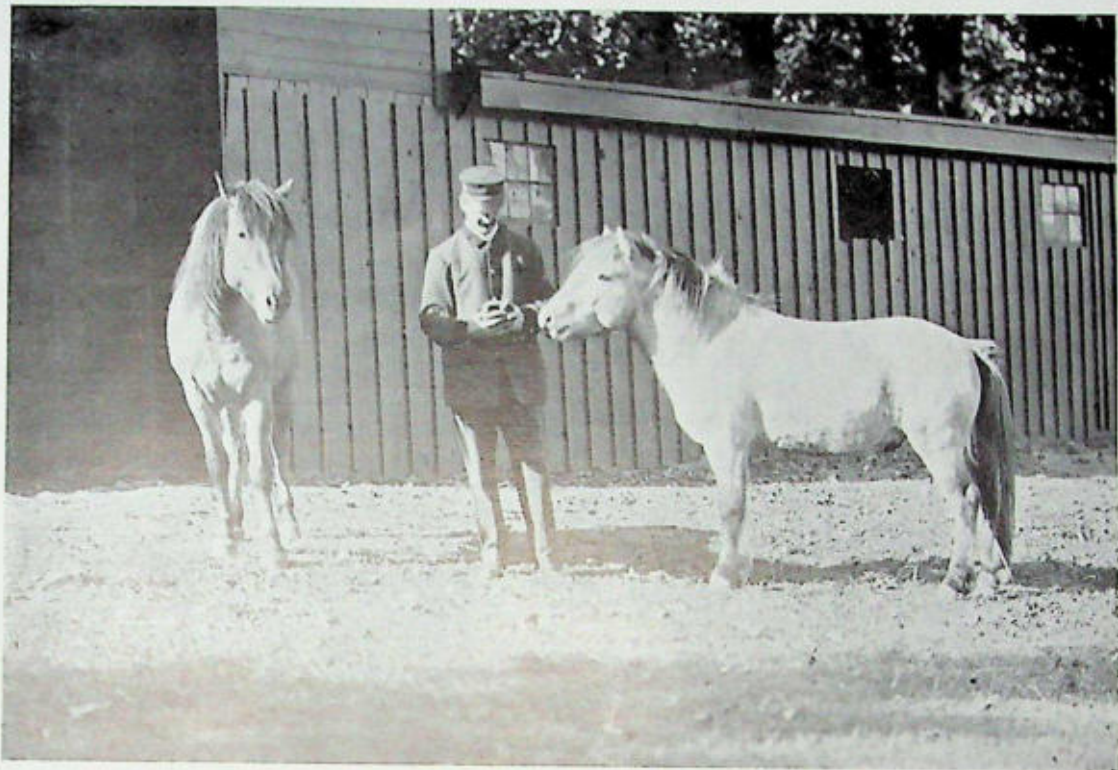
Seven zebras, including four distinct species, make this the best collection in the country of that wonderfully decorated equine.

The Przewalsky wild horse is represented by a thriving little herd of six\*. While all of these are of Mongolian extraction, four of the family may boast of being Park-born.

The Przewalsky, while not greatly admired by breeders of fancy stock, is of zoological importance as being the only true wild horse now known. The so-called wild horses of the prairies, so abundant a few years ago, became wild only after escaping from domestic herds.

To the Park collection, there has been added recently two interesting horses, the Celtic horse, (*Equus caballus celticus*) from Iceland, and the

\*Since writing this article two have been sold.



THE CELTIC AND NORSE HORSES

The Celtic horse (side view) is specially adapted to severe climates. The small head suggests relationship to the Arab.

Norse horse, (*Equus caballus typicus*) of Scandinavian descent. They were obtained by Professor Henry Fairfield Osborn from J. Cossar Ewart, of the University of Edinburgh, who has devoted much study to the *Equidae*.

The peculiar importance of these horses is due to the fact that they represent ancient wild types that roamed over Europe long before the industry of domesticating animals began. In this connection Professor Ewart has for many years studied the fossil ancestors of the horse, the palæolithic evidence as shown in the art, implements and life history of the men of the Stone Age, and the facts collected from early history. He has also made a study of modern strains, as well as of experimental breeding, and is convinced that the Celtic horses now under domestication in Iceland are the direct descendants of a very hardy northern species that has come down to us through the ages in an almost pure state, having been changed but little either by artificial selection or by cross-breeding with other strains.

It seems highly probable that this species branched off at an early period from the Arabian or North African stem and spread

northward, becoming smaller in stature and more adapted to a severe climate, but retaining many characteristics in common with the present Arabian horse. In both species we find a high degree of intelligence, an extremely docile temperament, and a similarity in the eyes and in the shape of the head. In both Celtic and Arab the hind chestnuts (leg callosities) are absent, and all four ergots (fetlock callosities) are either very minute or entirely absent.

In growth of hair the two species do not widely differ in the summer coat, but the heavy winter pelage of the Celtic is in striking contrast to the sleek-coated Arab. When the horses arrived at the Zoological Park on October 16, the short, summer coats had grown considerably in anticipation of the approaching season, though they were still far from being a winter's garb.

The Celtic, which has been named Celt, is a horse about twelve and one-half hands in height, but rather short-limbed. The coat, in effect a brownish gray, is a fine mixture of pure white hairs with brown, with a greater per cent. of white hairs on the sides and under parts. Along the ridge of the back, black hairs take



THE NORSE HORSE

Showing dorsal strip and mane falling on one side.

the place of brown, making a well-defined dorsal stripe. Suggestive of an ancestral type are the very faint horizontal stripes on the knees and hocks. A heavy mane, falling on both sides of the neck, and a very full forelock, the longest hairs of which reach down to the nostrils, add to his shaggy appearance.

The most highly specialized character of the Celtic horse is the tail-lock. Unlike the deciduous body hair, the mane and tail of most horses are persistent and grow continuously at a rate sufficient to counteract the ordinary wear. With the Celtic, the hair on the lower two-thirds of the tail is of the usual sort, while that of the upper third is deciduous and comparatively short during the summer, but in winter reaches a length of five or six inches, spreading laterally and sloping downward, forming a thatch to protect the hind quarters. With this tail-lock, a thick coat of body-hair five inches long, and a heavy mane protecting both sides of the neck, we expect Celt to thoroughly en-

joy our coldest weather. During the first hard snow storm, if he lives up to his reputation, we will find him standing tail to windward, the head somewhat lowered so that the very small ears are buried between the mane and forelock, a beard protecting the throat, and the tail-lock spread to the gale, lodging a small snow-drift which thus forms a double thatch. So protected he will wait quite unconcerned for the storm to abate when, with a vigorous shake, his accumulation of snow will be unloaded.

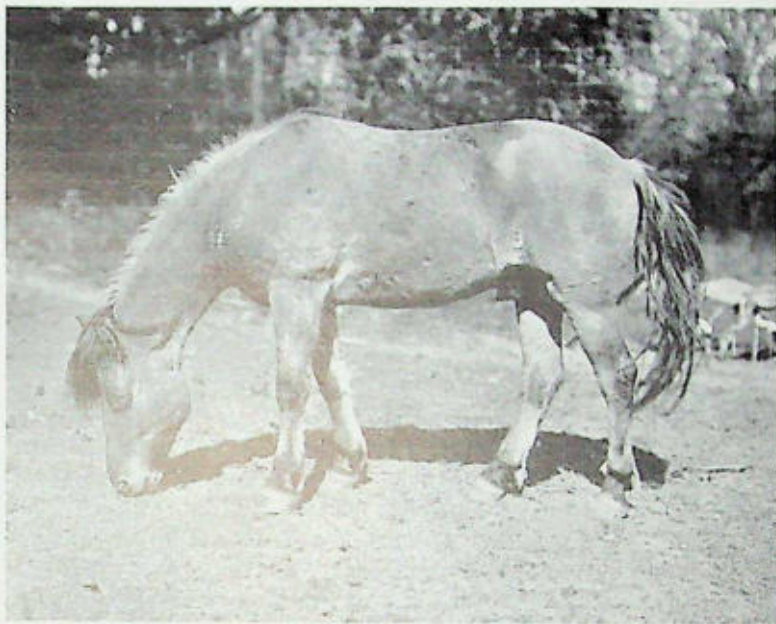
Although a stallion, Celt is of the gentle disposition so characteristic of his race, and was broken to the saddle and harness by a twelve-year-old boy.

The Norse horse, (*E. caballus typicus*) is a much coarser type than the Celtic, and in many respects is similar to the wild Przewalsky horse of Mongolia, though really quite distinct. As in the wild horse, all of the eight callosities are present. Dorsal and leg stripes suggest a relationship, but an essential difference is found



THE CELTIC HORSE

The tail-lock of winter hardly noticeable, photograph having been taken in October.



NORSE HORSE

Showing fall coat. Photograph made in October.

between the upright mane and entire absence of forelock in the wild horse, and the falling mane and full forelock of the Norse horse. Another point of difference is in the character of the tail. While in this respect the Norse horse is not unlike the average cart horse, the caudal appendage of the wild horse is quite distinctive, supporting long persistent hair on the lower third only, the hair on the upper two-thirds of the tail being deciduous and not more than four or five inches long even in winter.

It is believed by Ewart, Osborn and others that these two species branched off from a common stem many thousand years ago. During historic time, probably about the 12th century, the Norse horse was introduced into Scotland from Scandinavia. It was this species which the great naturalist, Linnaeus, in the year 1766, called *Equus caballus*, though the name was afterward applied to all domestic horses.

Our Norse horse, which has been appropriately named Viking, is a very typical specimen, about thirteen and one-half hands high, a yellow dun in color, with dark dorsal stripe strongly defined. The horizontal striping of the knees and hocks is much more noticeable than in his Mongolian relative.

In temperament Viking is almost gentle, though perhaps not quite so intelligent, as his companion Celt.

Both seem perfectly acclimated, and happy in their new environment, and now that the prescribed period of quarantine is past, they are ready for inspection on the knoll just west of the Zebra House.

The Government requirements are very exacting regarding the quarantine of hoofed animals from the Old World, on account of the various diseases that they might carry. The period of quarantine in the Park is about thirty days.



THE CELTIC HORSE

Winter coat only beginning to develop. Photograph made in October.



HEAD OF NORSE HORSE

Nose heavier, ears much larger and forelock less developed than Celtic.



HEAD OF CELTIC HORSE

Note the heavy forelock and extremely small ears.



HOCK JOINT OF NORSE HORSE

Horizontal stripes on hocks and knees suggest relationship to Przewalsky horse.



THE CELTIC HORSE

Thick mane falling on both sides of the neck.



EUROPEAN BROWN BEAR CUBS

## ITEMS OF INTEREST.

*Australian Mammals.*—The collection of mammals has been materially strengthened by the addition of a valuable series of specimens from Australia. These animals were brought direct from their home country by Mr. Ellis S. Joseph, an up-to-date collector of, and dealer in, wild animals. Mr. Joseph made the trip from Sidney, N. S. W., stopped at Honolulu, and went thence to Victoria, British Columbia. From there he crossed the continent to New York. In all this long journey his losses were trivial and his animals arrived in excellent condition.

The new animals necessitated some shifting and rearrangements in two buildings, and in consequence we are now exhibiting a splendid series of kangaroos. Of these, the following were brought by Mr. Joseph: pair of red kangaroos; a pair of Parry's kangaroo; a pair of Island kangaroos; a pair of tree kangaroos; a pair of wallaroos a pair of agile wallabies; a pair of black swamp wallabies and a pair of rock wallabies. Among other interesting marsupials received in the same shipment were three pairs of Tasmanian devils; one Tasmanian wolf; a pair of gray phalangers; three flying phalangers and two adult wombats. One of the latter animals is carrying an alert and active youngster in her pouch.

The shipment also included a pair of sloth bears, one Himalayan black bear and two Cape lynx, of which the Park stock is greatly in need.

*South African Reptiles.*—In the Joseph Australian collection were a number of reptiles that represent the first foreign additions of consequence to the Reptile House since the outbreak

of the war. Among these new specimens were eight water lizards, two frilled lizards and ten snake-necked turtles. A collection of South African reptiles arrived soon after. These came from Mr. J. Alden Loring, who has been on an extensive purchasing trip for the Society. Mr. Loring shipped us a black cobra, three specimens of the boomslange or tree snake, eighteen puff adders and fifteen mole snakes. The latter species receives its name from its habit of entering the burrows of small animals.

*Axis Deer Herd.*—The increase of our axis deer herd is worthy of note. Nine perfect fawns have been added during the present year. These beautiful deer are in much demand for private collections and we have sold many specimens. We endeavor to maintain this herd at twenty head, or more. Demand from many sources early in 1915, reduced the number to eleven individuals. There are now twenty-seven deer in the herd.

Our elk herd also has materially increased in numbers, and we are much interested in noting the development of several fawns born during the latter part of October. Whether or not these late-comers will acquire enough strength to endure the winter cold, is a problem. Normally elk fawns are seldom born later than July, and should attain a good growth by the arrival of the cold season.

*Rare Baboons.*—We have been fortunate in obtaining young specimens of the mandrill and the common drill, and the Primate House now contains good understudies of the spectacular baboons that we have kept in the past. The young specimens are gentle and playful, in marked contrast to the very savage and powerful adults of the species named.

*A Crafty Polar Bear.*—Silver King, the sullen polar bear, has developed a stubborn dislike to housecleaning, and by his sly antics renders it extremely difficult for the keepers to enter his den. This bear is too savage to share his den with the men while they are at work, as do the other bears, and therefore his den is provided with a shifting cage with sliding door. The regular procedure is to place some meat in the shifting cage, and when Silver King enters, the sliding door is closed. That cage is of small size, and the bear of huge proportions.

Of late Silver King's strategy has been to stretch a hind foot backward across the track of the door, to prevent its being closed. We have tried tying his meat at the outer end of the shifting cage, but Silver King renders this

procedure unavailing by lying almost prone, with one hind foot stretched backward, and tearing away the meat with a much extended forelimb. By exercising patience we sometimes catch him unawares—and it is then that the gate-chain is quickly pulled, after which the den may be thoroughly cleaned.

*The Bears' Winter Diet.*—With the approach of cold weather, the load of bread, meat and fish going to the bear dens is steadily reduced. All of the bears are now very fat, and approaching the time when many of them seek a snug den in which to spend much of the winter in a condition of sleep or drowsy wakefulness. While none of our bears here actually hibernate, all of them sleep much during the winter, and consume not more than a quarter of the amount of food that is eaten during the summer months. Several of our Alaskan bears have been observed to remain from two to three days in their dens, while their food remained untouched.

*Pachyderm Recreation.*—Owing to the mild, dry weather of the present fall, the elephants, hippopotami, rhinoceros and tapirs roamed in their yard until well into December. These animals are now in winter quarters, indoors, although even in winter they will be permitted an hour or so exercise on mild and sunny days.

Visitors remark upon the darker hue of the elephants, as well as the Indian and African rhinoceros. This results from scrubbing them, and when the skin was well cleaned, giving the animals a thorough oiling. This is done with a large brush, and about five gallons of oil is consumed in treating all the inmates of the Elephant House. After oiling them it is necessary to exclude all draughts, and keep the building well warmed for several days, until the heavy skin has absorbed the softening mixture.

*Mammal House Repairs.*—The work of renewing the old cages in the Small-Mammal House has been two-thirds completed. The new cages are of ideal construction, and are much more satisfactory than were the cages of the original series, even when new. With them it is possible to maintain a more wholesome atmosphere than in the past. With the new construction, the floors are non-absorbent, wood-work and sliding partitions have been eliminated, the fronts are more open, and a series of cement gutters form perfect drainage. A number of new cages are already occupied by the miscellaneous small carnivores.

*Active Beaver Colony.*—This has been a busy fall for our colony of beavers. They have spent much time plastering the outside of their big house with mud to render it cold-proof, and in building what appears to be an elaborate levee extending some twenty feet northward from the house. They are yet busily working on the latter structure, the object of which we hope will be revealed. There have been many trips with mouthfuls of leaves and twigs to the dam. These beavers are the first ones we ever have had that freely exhibit themselves in the daytime, and work busily when visitors are looking on.

R. L. D.

## A COLLECTION OF BIRDS FROM AUSTRALIA.

By LEE S. CRANDALL,  
Assistant Curator of Birds.

THE birds of Australia and the neighboring islands always have been rare in American collections. Especially has this been true of late years, the passage of protective laws prohibiting the shipment of live birds from Australia almost completely shutting off the meagre supply. These laws recently have been somewhat modified, however, and this action, in conjunction with the European war, has brought about an unusual condition in the bird market.

In pre-bellum days, whatever shipments were made from Australia invariably went to England, where the most desirable specimens were disposed of, the balance being sent to America. The present almost total lack of demand in Europe, and the recent prohibition of the importation of live birds into England, have deflected to this country quantities of Australian birds. The great majority of arrivals are through San Francisco, and California dealers are usurping much of the business formerly transacted in New York.

Of greater importance than this rather casual trade, however, is the attraction of experienced travelling dealers, who handle live animals in large numbers. Mr. Ellis S. Joseph has spent the greater part of his life in collecting and transporting specimens. Most of his work has been done in Australia, Africa and Asia, so that he has seldom visited America, even then never reaching New York.

Abnormal conditions affected him as well as other dealers, and in August, 1916, a cable message announcing the coming arrival of a



BRUSH-TAILED WALLABIES  
Pair of specimens recently received from Australia by the Society.

large consignment of Australian fauna, was received by Dr. Hornaday. This was followed by a more complete list, which showed the collection to be an uncommonly rich one. Tentative orders were placed at once, but it was not until early November that the specimens finally arrived at the Zoological Park. All were in excellent condition, for which Mr. Joseph merits congratulation. The birds were numerous, some being of such unusual interest as to deserve special mention.

The gem of the lot is a New Zealand giant petrel, (*Macronectes giganteus albus*). This bird, a brobdignagian cousin of the Mother Carey's chicken, is the largest of the petrels, exceeding in size many of the albatrosses. It is a wanderer about the seas of Australia and New Zealand, breeding on the rocky ledges of small sea-bound islands. It is carnivorous in habit, feeding on such fleshy carrion as it can find, and not hesitating to attack any living creature weaker than itself. Two color phases are found, one smutty brown, of which our specimen is a representative, and the other pure white, with intergrading intermediates of every degree.

An account of the capture of the petrel is given by Mr. D. le Soeuf, in the *Emu*, the organ of the Royal Australian Ornithologists' Union, for October, 1916. Two fishermen, sailing in Port Phillip Bay, Victoria, observed a strange bird floating nearby on the water. A hook was baited with bread and thrown toward the waif, which readily took it. The hook caught in the bill without injuring it, and the bird was easily secured. Needless to say, it was a capture worth making.

Two kea parrots, (*Nestor notabilis*) are easily worthy of second place. Interesting enough for their rich olive plumage, with a touch of red, and the strong feet, adapted to a life chiefly terrestrial, the kea recently has developed a habit which gives it a sinister attraction.

According to Mr. G. R. Marriner,\* in 1867 the shepherds in northwestern Otago, South Island, New Zealand, noticed that their sheep appeared to be affected with a strange disease, which left severe scars on the loins. It soon became obvious that these scars were the remains of wounds made by some creature, the identity of which was obscure.

Many theories were advanced, but investigation soon disclosed the kea as the culprit. It was found that the bird settled on the rump of the living sheep, and tenaciously retaining its

grip, tore away and ate the flesh of the unfortunate creature, usually causing its death. Most observers declare that the fatty capsule of the kidney is the ultimate object, but others believe that these organs are attacked because they are most readily accessible, and not from any special preferment.

This curious change from a mainly vegetable diet to a fiercely carnivorous habit is no more remarkable than the perfect manner in which the bird is fitted for its sanguinary work. The long, slightly curved upper mandible, specialized for uncovering seeds, roots and grubs, is admirably suited to its new-found gruesome task; the strong claws find no difficulty in fastening themselves in the wool of the victim.

The offering of liberal bounties quickly led to the destruction of the birds in large numbers. The slaughter still goes on, but it is believed that the kea will continue to persist in the fastnesses of the mountains which form its home.

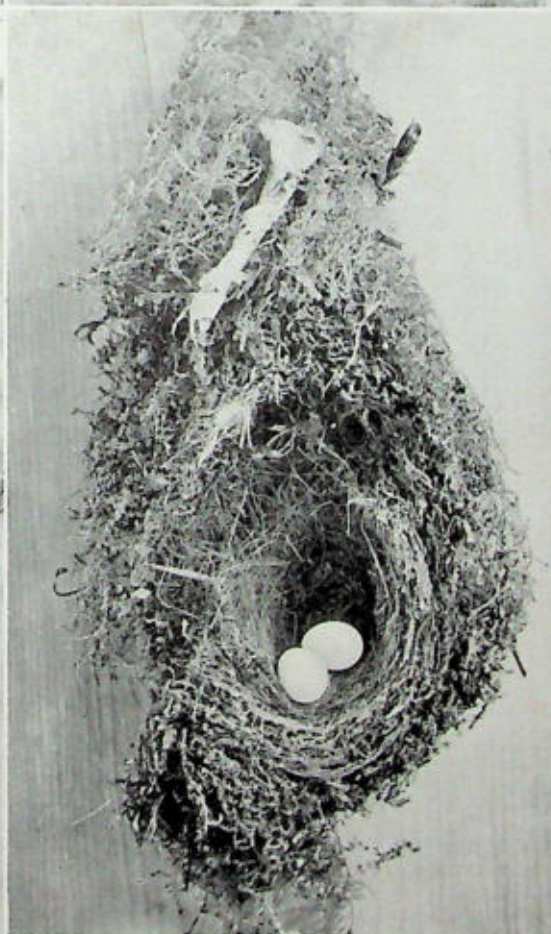
The fowl-like birds are represented in Australia only by a variety of quail and several large species known as megapodes. The latter are aberrant in several characters, the most interesting of which is the habit of depositing their eggs in large mounds of jungle debris, and leaving them to be hatched by the heat generated by the decaying vegetation. The young birds emerge with wings well developed, and are quite competent to care for themselves.

Two species of these birds were brought by Mr. Joseph—the brush turkey, (*Cathartus lathamii*) and the much rarer ocellated megapode or mallee fowl, (*Alectura ocellata*).

A pair each of the Australian white ibis, (*Ibis molucca strictipennis*) and the straw-necked ibis, (*Carphibis sinicollis*), are welcome additions to the Flying Cage group. Neither species has previously been exhibited in the Zoological Park. A pied crow-shrike several white-winged choughs, a satin bowerbird and a fine pair of wedge-tailed eagles, besides a considerable array of smaller fry, complete the collection. Mr. Joseph expects to return to New York next spring, and we are hoping for an even greater array of the desirable birds of the Antipodes.

*Old Python Dies.*—Our large python that had lived in the Reptile House for about fifteen years recently died. Curator Ditmars had estimated its length at twenty-two feet. When it was measured it was found to be exactly twenty-one and a half feet. The weight of the huge snake was one hundred and seventy pounds.

\*The Kea: A New Zealand Problem, p. 73.



Photographs by William Beebe and Paul G. Howes

INTERESTING BIRDS' NESTS FROM SOUTH AMERICA

Nest and bird: cayenne Hermit Hummingbird.

Nest and eggs of the Guiana Pygmy Flycatcher  
(*Pyrrhuloxia acer*). New to Science.

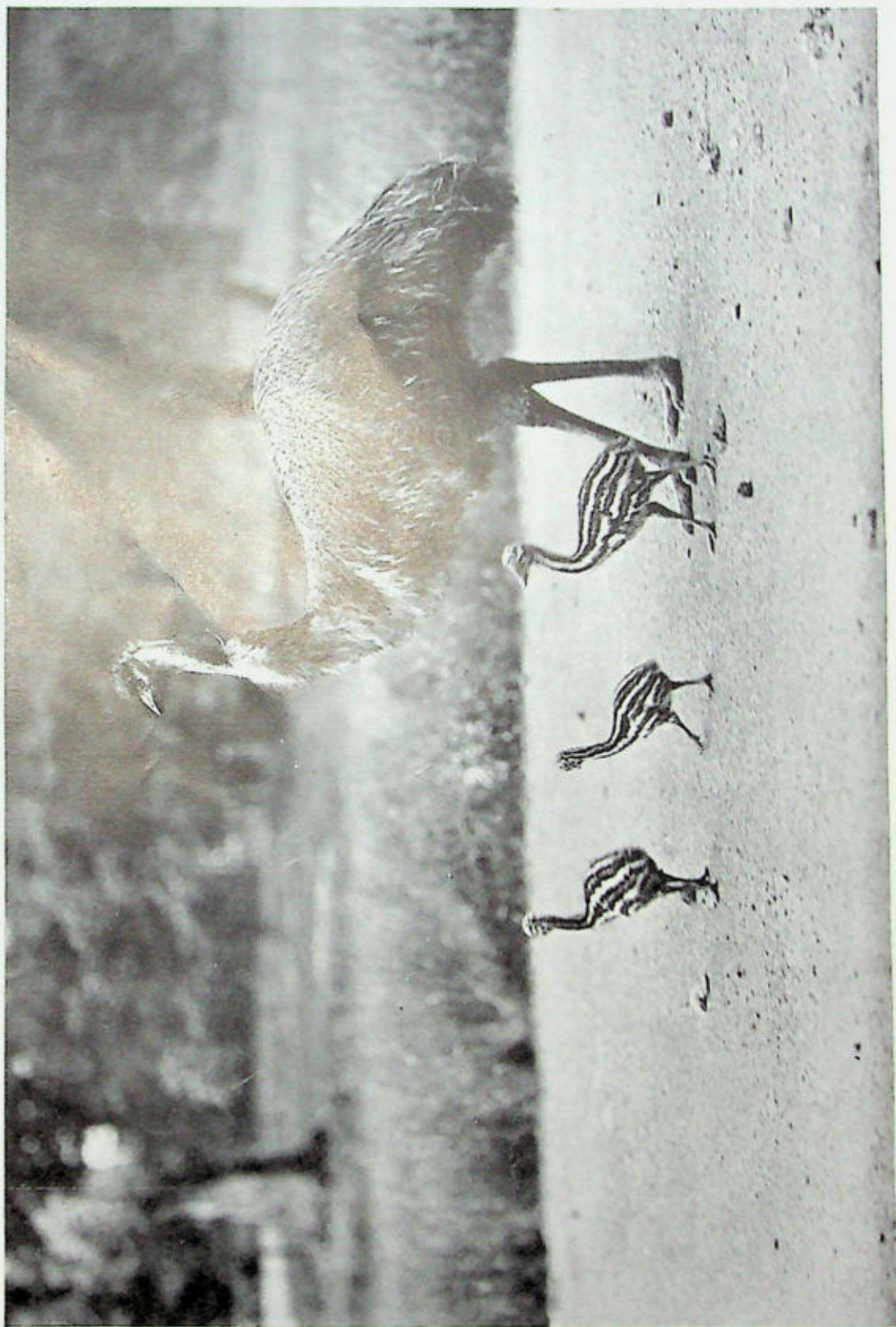
Hanging nest and eggs of Oily Flycatcher  
(*Mionectes olivaceus*).



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ADULT MALE EMU AND YOUNG  
The chicks are about three weeks old. The smallest bird was released from the shell by the keeper.

# ZOOLOGICAL SOCIETY BULLETIN

*Published by the New York Zoological Society*

VOL. XX.

SEPTEMBER, 1917

NUMBER 5

## OUR EMU FAMILY

*By* LEE S. CRANDALL.

WHEN our devoted male emu first became a father, his inexperience in rearing emus was equalled by our own. Young parents are proverbially foolish, and when a mother with advanced ideas refuses to accept the responsibility of caring for her offspring, a domestic calamity threatens.

But feminine slackers are quite the usual thing in emu families. Ages before the first lady of our own race conceived the idea that she was much too busy to be bothered with the care of babies, Mrs. Emu had turned over to her mate the drudgery of the nursery. She felt that the production of eight or nine delicately-tinted green eggs, artistically etched over with a darker shade, was burden enough for one who wished to be more than a mere household slave.

In Australia, emus at liberty breed from April to November. Just why our birds should decide that, in New York, January offered the most suitable conditions, still is a mystery.<sup>1</sup> At any rate, our first emu egg appeared on a frosty morning early in 1915. Its advent caused little excitement in the emu colony. The prospective father appeared unsuspecting of impending fate. The mother was indifferent concerning the future. Their combined intelligences were unequal to the task of protecting the egg from frost, and instinct had had no experience with such an emergency. The egg froze and burst.

Birds are actuated chiefly by instinct. Since this influence, unaided, seemed insufficient to cope with 10° Fahrenheit, reason, in the form of a rounded stone coated with green paint,

came to its assistance. The female emu was persistently watched by her keepers and the instant the next egg appeared, the stone was substituted for it. Not that it really mattered, for neither bird was at all interested.

By this means, six perfect eggs were accumulated. When instinct suddenly convinced the male that nothing could be more attractive than reclining on a bed formed of three large, hard stones, the six eggs were entrusted to his care. As already recorded,<sup>2</sup> after many difficulties, caused by the untried state of all the principals, one baby bird was safely hatched and finally reared.

After this successful experience, we all felt that emu broods would become a matter of yearly routine. But we had planned without proper consideration of father-love. The emu was fond of his chick. There could be no doubt of that. So deep was the mutual attachment that neither bird could endure life beyond the sight of the other. As autumn approached, we viewed the strength of this feeling with some misgivings, for the period of courtship was approaching, and there was no indication that filial affection would tolerate encroachment.

In November, it became evident that father and son must be separated if the mother was to be restored to her rightful position. The chick, now well grown, was driven into an adjoining corral, separated by a wire fence. An emu's method of combatting material obstacles is to kick, hard. A wire fence is a dangerous antagonist, because it is too springy to be affected by a blow, but is very likely to enmesh

<sup>1</sup> In Australia the summer month of January is the equivalent of our July. M. G.

<sup>2</sup> BULLETIN, Vol. XVIII, No. 5, September, 1915.



OUR GROWING EMU FAMILY  
The young birds are about three months old.



A PORTION OF THE EMU FLOCK

The peaceful appearance of the Emus in the illustration is not a true index of their normal state.

the trip-hammer feet. The distress of both birds took such a violent form that only a quick reunion prevented damage to property and limbs.

But, however distressing it might be, the family bond had to be severed. After a struggle, the young bird was seized and carried bodily to a large stall inside the Yak Shelter. Here were only smooth, discouraging walls to kick against, and the prisoner soon became reconciled.

In spite of our well-meant efforts, a conjugal reconciliation did not take place. The male finally came to tolerate his erstwhile mate, but that was all. Autumn chilled to winter, and with the coming of spring, the young bird emerged from his indoor imprisonment and rejoined his parents. He was now nearly as large as they, and distinguishable only by the practiced eye.

Early in the next winter, there were evidences of renewed affection between the old pair. In February, 1917, matters had so well progressed that a frozen egg was found one morning in a corner of the corral. Now came a demonstration of the value of experience. A stone egg was quickly produced and placed on the floor of the indoor shelter. The bird showed the deepest interest in the substituted egg, and covered it carefully with straw and

debris, which was rearranged daily. The indifference of callow youth had been replaced by the solicitude of maturity. Our emu had become a professional father.

The female was, if possible, even more irresponsible than ever. Her eggs were deposited in every corner of the enclosure, at intervals varying from four days to a week. Only the vigilance of her keeper prevented the loss of every one. As each egg was laid, a wooden or stone imitation was placed in the shelter. Here they were received, covered and duly inspected in good faith by the male.

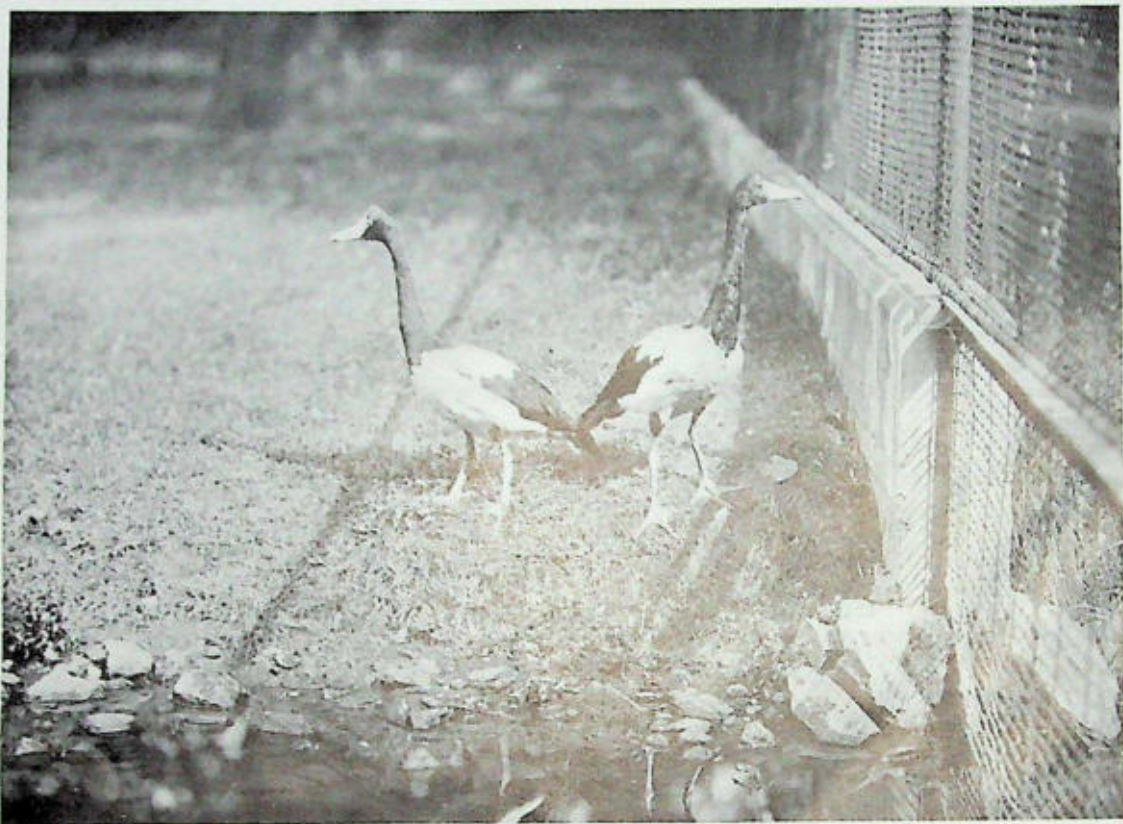
After six had accumulated, the bird became broody and spent much of his time in sitting about on the ground. He continued to look after the eggs, but made no effort to begin incubation.

Two vestibules lead to the inner room occupied in winter by the emus. We had wished the bird to make his nest in the smaller one, for its dimensions were more suitable for arranging the nest. But the vagaries of instinct again became evident. The bird refused to brood there. A lovely nest of fresh, green sod, occupied by five attractive dummy eggs, could not lure him. He often pecked in at the door of the proposed nursery, but although the eggs had been there from the first, he now refused to enter.



TAWNY FROGMOUTH

This odd-appearing bird is a connecting link between the nighthawks and the owls. It is nocturnal in habit and remains quiet during the day. Although of fierce aspect, our specimen is exceedingly gentle.



## SEMPALMATED GEESE

The reduced webbed formation between the toes indicates an adaptation to terrestrial life. This Goose is becoming very rare in Australia; its native habitat.

Fearing that the fatherly impulse might pass, we removed the nest from the first vestibule to the one of the bird's choice. It evidently accorded with his notion, for he lost no time in taking up his eight weeks' vigil.

Three eggs, perhaps frosted, later had to be removed, but eventually three beautifully-striped chicks appeared. The third had difficulty in extricating itself, and was saved by the efficiency of the keeper. The young birds have grown beyond expectation, and are much brighter and more active than the one of two years ago. Perhaps it is not surprising, for their father is now a model foster mother.

## THE AUSTRALIAN BIRD COLLECTION.

By LEE S. CRANDALL.

WHEN Ellis S. Joseph arrived from Australia in November, 1916, with a large assortment of live birds and mammals, we were quite amazed by their diversity. Our

enthusiasm served as a stimulus, and Mr. Joseph was moved to assert that later on he would show us something new and surprising. On July 7, 1917, he again reached New York, prepared to make good his promise.

Two seventy-foot horse cars were required to transport the huge collection from Victoria, B. C., to New York. Cages of all shapes and sizes were piled high, and even a hasty examination revealed many rarities not previously imported. Mammals and reptiles were well represented, but of birds there was a truly amazing display. All were in excellent condition, Mr. Joseph being a much harassed, but uncommonly efficient modern Noah.

An attempt to describe all of the birds of the collection would involve a review of Australian ornithology that would strain the capacity of the BULLETIN. We must confine ourselves to a notice of a few of the more striking species.

From a zoological viewpoint, the two tawny frogmouths, (*Podargus strigoides*) certainly are



CAPE GANNET

Although birds of strong flight, none of the Gannets can rise from the ground. They are helpless on land unless they can project themselves from some elevation.

the most important. To native Australians, the bird is known as the "frog-mouthed owl," a term which, like many colloquial names, is singularly apt. The bird's exact position in systematic zoology is still a matter of some doubt, but by most authorities it is considered to be related closely to the goatsuckers and the guacharo or oil-bird, and more distantly to the owls.

In appearance, the frogmouth is a huge night-hawk, the cavernous gape being armed with a strong, horny beak. Appetite and capacity are well co-ordinated, for this weird creature is able to bolt mice and sparrows in numbers that would discourage any other bird of similar size.

Outside a few groups, white birds are scarce; consequently, the white goshawk, (*Leucospiza novae-hollandiae*), is of peculiar interest. Certain other accipitrine birds, such as some of the gyrfalcons, are mainly white, but all carry markings of one sort or another. The white goshawk is truly white. The only bits of color upon it are found in the yellow legs and black

beak, which serve to intensify the purity of the bird's plumage.

Such conspicuous coloration in a predaceous bird, by warning intended victims of its approach, might be expected to interfere with its success in life. But the great multitudes of white cockatoos found in Australia make the snowy coat of the goshawk an asset. Small birds are said to view its approach with little concern, doubtless mistaking the marauder for a harmless cockatoo—an avian wolf in a sheep's skin of feathers.

Few white goshawks have been kept in captivity, and the species may rightly be considered one of the rarest of the birds of prey.

Australia abounds in brightly-colored parakeets, many of which are represented in our collection. Probably the most brilliant of all is the red-capped or pileated parakeet, (*Purpureicephalus pileatus*). It is green above, with red crown, greenish yellow cheeks and rump, and violet breast. This splendid bird is becom-

ing rare and, Mr. Joseph says, ours is the only specimen he has seen in fourteen years of active collecting. He found the bird in a bushranger's hut in the forests of the southwest. It quickly changed hands for the modest sum of five shillings, with "three bob for the cage." The histories of our birds, before they reach us, if they could be wholly known, would reveal much of interest.

Among so many celebrities, the birds of paradise are still conspicuous. The arrival of our first specimens, not many years ago, created a sensation; but now we are seldom without at least one species. Still, adult males in full plumage remain the most wonderful of our birds, and consequently the fine pair of Count Raggi's bird of paradise, (*Paradisea raggiana*), are decidedly welcome. The male appears to have acquired the ornamental flank plumes this year for the first time, so we may look for a further increase of glory. It is seldom that two birds of paradise will share a cage, but these are as affectionate as love-birds.

Ordinarily, one thinks of pigeons as quiet birds, occasionally possessing ornamental markings or appendages, but usually dull in general color. This is quite true of most of the members of the family *Columbidae*, which furnishes the majority of the species commonly seen in captivity. But there is another great group, the *Treronidae*, or fruit pigeons, which rivals the parrots in the brilliancy of its greens, reds and purples. The fruit pigeons, as a whole, are not easily kept in captivity and, moreover, are exceedingly rare, a combination which amply explains the infrequency with which they are exhibited. Mr. Joseph has brought us two beautiful species, the painted fruit pigeon, (*Ptilopodiscus coronulatus*), and the purple-crowned, (*Lamprotreron superba*), the former from the Aru Islands and New Guinea, the latter from Australia. So far, they have belied their reputation for delicacy, and now are in the best of health.

#### THE AUSTRALIAN MAMMAL COLLECTION.

By RAYMOND L. DITMARS.

FOR the second time since the annihilation of the European animal market by the war, we have received a large and varied consignment of mammals, birds and reptiles from Australia, as well as a number of particularly interesting South African species. This is the second demonstration of the skill and perseverance of Mr. Ellis S. Joseph, of Sydney, Aus-

tralia, in successfully gathering and transporting large collections of animals, and journeying with them practically half way around the world, during times when extraordinary shipping difficulties are to be encountered.

Mr. Joseph's two trips have resulted in making our collection of kangaroos and other Old World marsupials probably the most extensive ever exhibited in the United States. In fact we are now exhibiting as many species of kangaroos as are listed in the Royal Zoological Society's Gardens, at Victoria, Australia, where all sources of supply are immediately available for the gathering of kangaroos, and which maintains the best collection in the world.

In the imposing series of marsupials that we are exhibiting, are forms that parallel in development, size and appearance the representatives of various widely different orders of mammals. The strictly carnivorous and wolf-like thylacine is a striking example. It is the largest of the carnivorous marsupials. Another is the wombat, in form like a huge woodchuck, but precisely like a rodent in habits. The phalangers are remarkably like lemurs in form, actions and habits, while the flying phalangers in becoming adapted to long, scaling leaps, have undergone development like the flying squirrels and so closely resemble those types that an expert might be deceived upon a superficial examination of them.

A series of photographs is herewith presented to show the striking forms of our new accessions. This number of the BULLETIN also contains a descriptive article of the collection of birds that were part of Mr. Joseph's consignment.

A number of the species in the latest aggregation of Australian arrivals are new to our collections. There are several species that have never before been exhibited alive in the United States. Among the kangaroos, the most remarkable type is the West Australian rat kangaroo, (*Boettlongia campestris*). When sitting upright this animal is only fourteen inches high. It is particularly interesting and remarkable because of the strange development of the tail. It is one of the smaller types, in which the tail is of no use as a support, as with the larger and typical kangaroos. The appendage is of marked importance, however, from two points of view. The tail appears almost naked, much swollen, corrugated, and apparently segmented into rings. It is actually a reservoir for the storage of fatty nourishment and enables the animal to pass periods of several weeks within the burrow without eating. After a period of such fasting,

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**ZOOLOGICAL SOCIETY BULLETIN**


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**Departments:**

<i>Mammals</i>	<i>Aquarium</i>
W. T. HORNADAY.	C. H. TOWNSEND.
<i>Birds</i>	<i>Reptiles</i>
WILLIAM BEERE.	RAYMOND L. DITMARS.
LEE S. CRANDALL.	

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Published *bi-monthly* at the Office of the Society,  
111 Broadway, New York City.

Yearly by Mail, \$1.00.

MAILED FREE TO MEMBERS.

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

ELWIN R. SANBORN,

Editor and Official Photographer

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VOL. XX, No. 5

SEPTEMBER, 1917

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the diameter of the tail is so greatly reduced by the absorption of fatty nourishment that the appendage is of the normal size of other small species of rat kangaroos that lack the characteristic described. Four species of the genus *Boettongia* are known, and all are remarkable in another use of the tail, which is employed for seizing and carrying grasses with which the animal makes its nest. A hollow is scooped in the ground, and the entrance being thus on a level with the surrounding herbage, is closed up with grass which the rat kangaroo drags after it. This skillfully designed lair is extremely difficult to detect.

Another particularly interesting species is the short-tailed wallaby, (*Macropus brachyurus*). Here is another of the smaller species, in which the tail is not used as a prop or support in assuming a sitting posture. Moreover, the appendage is so short it appears as if half of it had been lost. This species has, proportionately, the shortest tail of all of the kangaroo species, and may be immediately recognized by this unique development.

Other of the new kangaroos are interesting from their large size and rarity in collections. Among them is a huge example of the black wallaroo, (*Macropus robustus*), that stands fully five feet high, and is very savage. There are two specimens of the exceptionally rare ring-tailed wallaby, (*Macropus ruficollis*), and an example of the tree kangaroo, (*Dendrolagus bennettianus*). No more incongruous type of animal than a kangaroo in a tree, can be imagined, but this animal has become adapted to an arboreal life by acquiring elongated digits, which grasp like a hand. Curiously enough, its tail has not become prehensile, and while it is a sure climber, and ascends lofty trees, its progress is slow and not at all graceful.

The elaboration of our kangaroo collection results in a splendid series of these animals occupying the long row of cages on the easterly side of the Small-Deer House. This collection is especially interesting just now, as five members of the collection are carrying young in the pouch, thus illustrating the characteristic method of caring for the progeny among the marsupials. Within a short time they will be seen leaving the pouch, and again entering the receptacle as they become tired.

Two species in the new collection that appear to have arrived alive in the United States for the first time, are the curious rabbit-eared bandicoot and the opossum mouse. The former, known technically as *Perogale lagotis*, is of the size and form of a rabbit as regards body and limbs, but possesses an extremely long and pointed snout, minute eyes and a long, tufted tail. It is insectivorous. The opossum mouse (*Phascologale calura*), is one of the smallest known pouched animals, similar in form and size to a field mouse. It is nocturnal and the food largely consists of insects. The latter species is exhibited in the Reptile House, together with the delicate flying phalangiers, which require special care and even temperature.

Among miscellaneous mammals brought by Mr. Joseph is the Australian water rat, (*Hydromys chrysogaster*), a fish-eating species, and several of the smaller carnivora of South Africa.

The cages in the Reptile House also contain specimens of the Australian collection. Here were added a number of species of turtles, lizards and snakes. Among the latter are several of the more deadly types, with which Australia is so plentifully provided. These are the purple death adder, the brown snake and the bandy bandy snake. The venomous serpents of Australia are close allies of the cobras, and the greater number of them flatten the neck in cobra fashion, although they do not rear upward or assume such spectacular positions in threatening an enemy as do their formidable allies of Asia and Africa.

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**ZOOLOGICAL PARK NOTES.**

*Park Military Work.*—Company A of the Zoological Park Guards continues drilling and improving in military discipline and precision. The company is incorporated in the battalion of the Home Defense League attached to the 68th Precinct of the Police Department. The growth and increasing efficiency of the League has been particularly gratifying, and the vari-



RING-TAILED WALLABIES

It is quite obvious that the alternate bands of black and white around the tails suggest the common name.



RING-TAILED WALLABY AND YOUNG

The well-grown baby Wallaby is barely able to squeeze into the mother's pouch.



RUFIOUS-BELLIED WALLABIES

One of these Wallabies is so gentle that it will permit the keeper to carry it around in his arms. It is unusual for a kangaroo to be so tame.



WEST AUSTRALIAN RAT KANGAROO

A conspicuous feature of this animal is the thick tail, which serves as a food supply in cases of necessary fasting.



WOODWARD KANGAROO

A large animal with delicate, tawny gray pelage.



**BRUSH-TAILED WALLABY**

The young animal hangs out of the pouch with the utmost abandon. The weight of the baby offers no impediment to the mother's locomotion.



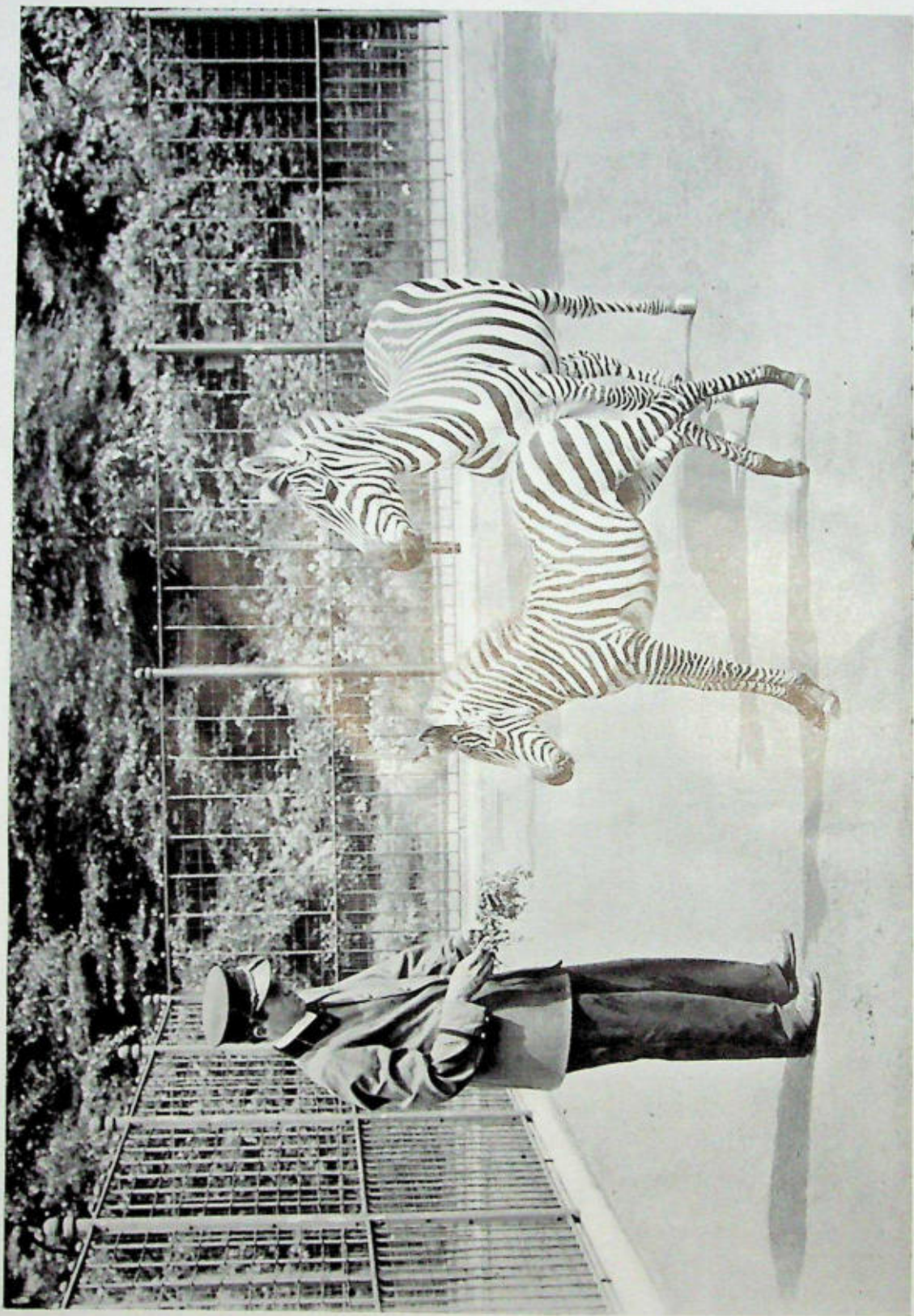
**SHORT-TAILED WALLABY**

This animal is characteristic in having a tail proportionately much shorter than any other Wallaby.



**BLACK-FACED KANGAROO**

When angered, this specimen stands erect, and while supporting itself on its powerful tail, strikes out savagely with its hind feet, and fairly may be called a dangerous animal.



GRANT ZEBRA AND HER YOUNG OFFSPRING

Both animals are quite gentle, but like most of the Zebras, very timid. After long hesitation, the little animal took the hay from the keeper's hand.

ous units frequently are assembled for regimental drills in the city armories. A regimental review of fourteen hundred men of the Bronx took place on August 14, at the 22nd Regiment Armory, and the balconies were thronged with the men's relatives and friends. Company A of the Zoological Park was given honor place in the line, owing to smart appearance during preliminary evolutions. The company was assigned to lead in both regimental review and parade. The 23rd Regiment Band and the Police Drum and Fife Corps officiated.

Company A has been drilled in rifle practice at an excellent range near Nepperhan, N. Y. The men visit the range in squads, and are instructed in the use of the United States Army rifle, and the operation of standard targets. At first the work consisted of operating the panel targets from the pits, and preliminary practice at 100 yards. When the work settled down to firing at 200 yards, a number of our men made excellent scores. Application has been made to have the men of the Company listed in the National Rifle Association, when this work on the target range will include firing for scores for which the Government awards medals for sharpshooters and marksmen.

*Australian Reptiles.*—Among various other zoological eccentricities, the snakes of Australia rival the strange mammals and birds of that country. In most countries the majority of the species are non-venomous. In Australia the great majority of the snakes are poisonous. Moreover, they are most deceptive in appearance. Some of the most deadly among them look precisely like the harmless snakes of other regions. Several species of these strange and interesting types are on exhibition in the Reptile House. The deadly black-snake appears much like the perfectly inoffensive black racer of the United States. The brown snake, another of the cobra allies, might readily be mistaken for the common coachwhip snake of the southern United States. Another is the tiger snake. It resembles a small, harmless water snake. A showman in San Francisco was recently so deceived in a collection of Australian serpents that he declared the tiger snakes to be nonvenomous, and expressed his willingness to handle them. Before he could be prevented from doing so, he endeavored to pick up a docile appearing specimen, by the tail. The snake turned like a flash and bit his finger; and he died a few hours later.

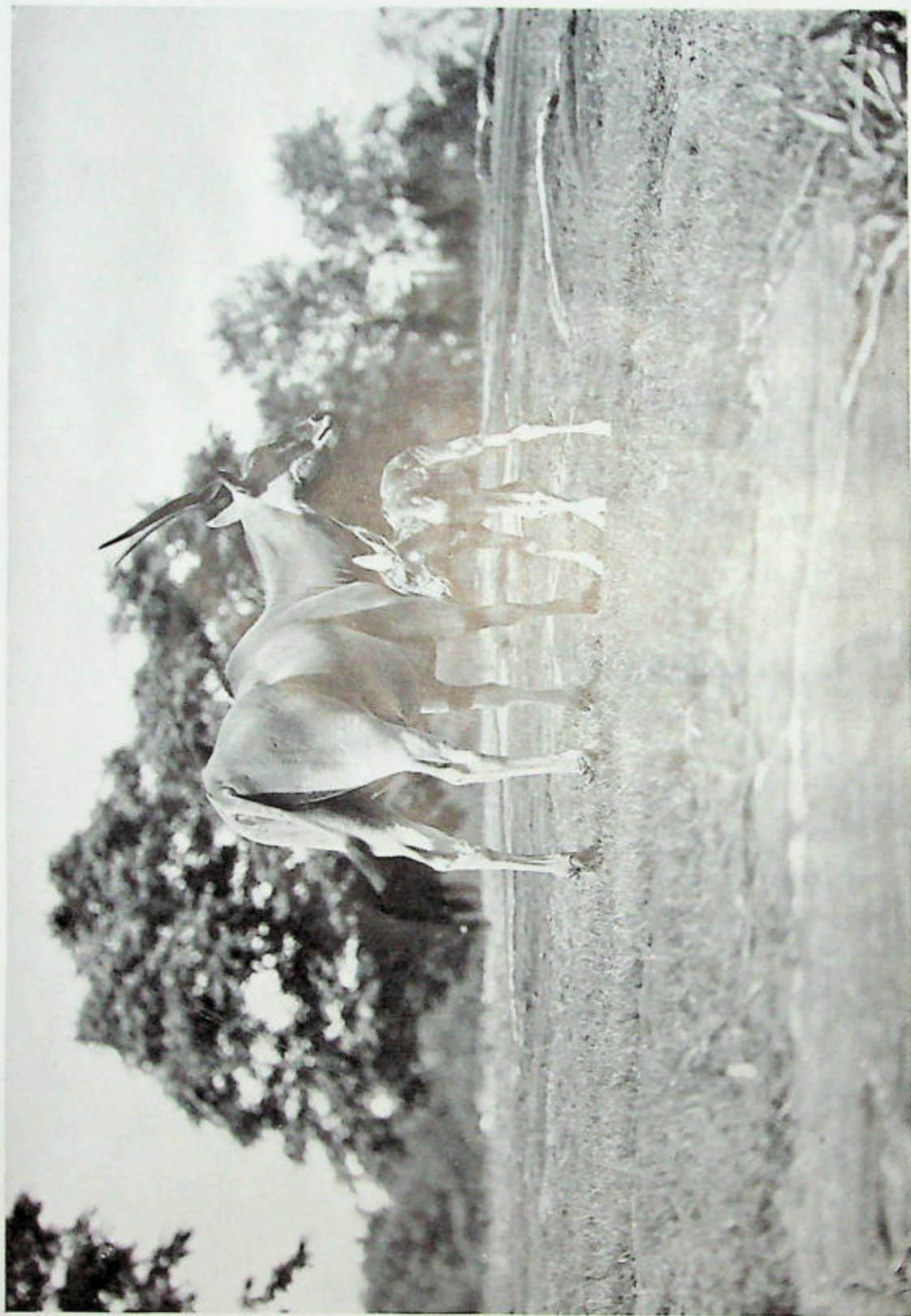
*Two-tailed Lizard.*—A curious lizard has arrived from California. It possesses two perfectly formed tails. This remarkable develop-

ment has been previously illustrated in the Reptile House, and attracted much interest. The abnormality is produced by the characteristic of lizards to grow an entirely new tail if the original member is lost in fighting or escaping from an enemy. The appearance of a second tail is brought about by the original appendage being nearly severed, but finally becoming firmly attached by tissue developing about the injury. The near loss of the tail excited the growth of a new appendage, which persisted in development, despite the retention of the original tail. The second appendage grows from the seat of injury, and has pushed the first tail to one side, producing a decorative and forked appearance.

*Communal Swans and Beavers.*—An interesting sight may be enjoyed any sunny afternoon at the Beaver Pond. In our colony of nine flourishing beavers there is a large female that is particularly tame. A pair of mute swans has been living in the beaver enclosure during the past summer, warily guarding a lone youngster. The little swan is clad in soft, gray, downy plumage in strong contrast to its parents. Its several brothers and sisters were killed by large snapping turtles that unknown to us lurked in the beaver pond, but now lurk there no more. When the swans are fed upon the shore, the large female beaver joins the group. The incongruous gathering of the snowy adult swans, their woolly, gray youngster and the big beaver, form an unusual sight.

*Climate Affects Deer Antlers.*—It appears that the abnormal spring, with its long continued cold and rain, and the long dry period in August, sensibly affected the antlers of our native deer. The ultimate effect, however, has been to hasten the development of the antlers, and most of the big bucks were "out of velvet" by the latter part of August. The antlers usually continue growing through the month of August, and the "velvet" is rubbed off about the middle of September. This year our elk were in fighting trim a month too early. The condition brought discomfort to the deer as the season of biting flies was still at its height, and it was necessary to place the bucks in smaller yards where their fighting propensities could be kept in safe bounds.

*Elk Herd Bests Flies.*—During the summer, the elk herd enjoyed especial protection from the biting cattle flies by bathing in a pond adjoining their range. This lake is rightfully in the range of the white-tailed deer. We tried the experiment of permitting the elk to run with the smaller deer, and perfect harmony



ELAND AND HER FOUR-DAY OLD BABY  
The Eland paddock is ideal. The animals thrive and live contentedly. This is the second calf born in this place.



AUSTRALIAN GRAY PHALANGER

This Phalanger and several related species are often called Australian opossums.

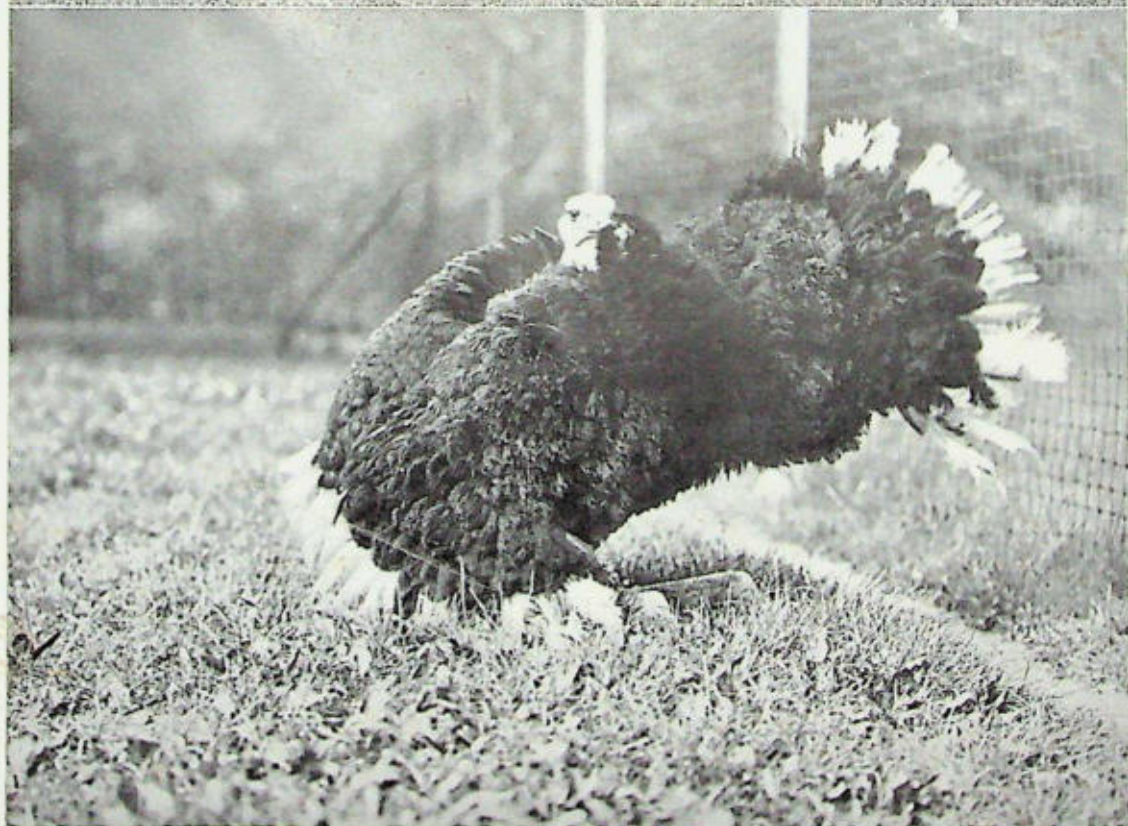
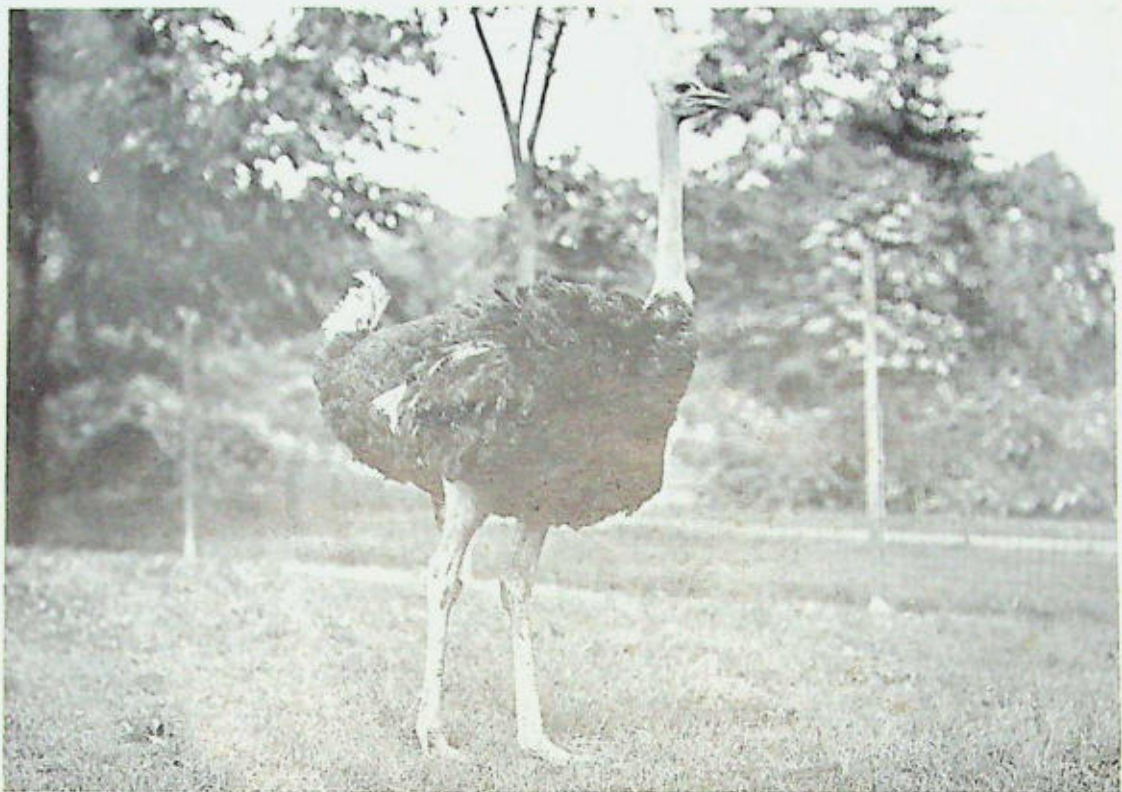
prevailed. The elk were turned out early each morning, after feeding, and at once they trotted to the pond. This body of water is quite broad, but shallow, and after splashing about for a time the entire herd would lie in the water, and doze or ruminant in defiance of the flies.

*Wild Babies.*—A beautiful male specimen of Grant's Zebra was born at the Park on the 24th of June. This gorgeously striped youngster and his mother are on exhibition in one of the big yards immediately west of the Zebra House. Among other hoofed animals that were born during the summer are an eland, a yak, and several each of American bison, elk, white-tailed deer, red, fallow, axis and sika deer.

*Nature Scorns Artifice.*—In one of the numbers of the BULLETIN mention was made of a curious horned rattlesnake on exhibition, that was actually a reptile with a grafted horn that had undergone an ingenious surgical operation. The Indians often thus decorate the big rattlers of the Boundary Region. Our specimen excited much comment, as the horn protruded

fully an inch from the head, and we were interested to learn what might happen when the snake shed its skin. That important event has taken place and the results were quite different from our anticipation. Several days before the shedding, the snake's head swelled to great extent and when the reptile emerged from its skin it crawled away hornless. A large circular scar on the reptile's head indicated Nature's refusal to abide by the artificial adornment.

*"Toto's" Clown Days Are Passing.*—For several years the orang-utan "Toto" has been the clown of the Park's collection. This animal's extremely amusing capers have delighted many thousands of visitors, particularly children. Toto has now outgrown the infant class, and is developing a hint of the sullen demeanor characteristic of the adult orang-utan. He is far less affectionate and confiding with Keeper Engeholm. Of late he has evinced a habit of "making faces," which is, in a way, a threat. Toto is about seven years old, and has been on exhibition with us nearly five years.—R. L. D.



SOUTH AFRICAN OSTRICH

An unusual picture of a phase of the nuptial dance, performed by the male Ostrich during the breeding season.  
The upper picture shows the bird just before the curious performance was started.

# ZOOLOGICAL SOCIETY BULLETIN

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GUILLEMOTS ON BOGOSLOF VOLCANO, BERING SEA

# ZOOLOGICAL SOCIETY BULLETIN

*Published by the New York Zoological Society*

VOL. XX.

NOVEMBER, 1917

NUMBER 6

## BIRD LIFE ON A SEA VOLCANO

*By C. H. TOWNSEND*

Illustrated from photographs made on the U. S. S. *Albatross*, 1891.

THERE is no reason why pictures showing animal life in out of the way places should not be published by the Zoological Society, even if they do not relate directly to the work of the Zoological Park and the Aquarium.

The photographs of sea birds reproduced in this BULLETIN, have been brought to light because they deserve a better fate than to remain buried in a private photograph file. They were made by the writer and his assistants in 1891 while serving with the Fisheries Steamship *Albatross*.

Bogoslof Volcano in Bering Sea, where the photographs were made, has had a century-long struggle with the sea for its existence and is of alluring interest quite aside from its ornithological wonders. It rose from the sea on May 7, 1796, and its birth was accompanied by earthquake. Volcanic rocks were hurled as far as Umnak in the Aleutian Islands, thirty miles away. It has changed in height and form many times since then. In 1806, lava flowed from it into the sea. In 1883, its volcanic ashes fell on Unalaska Island forty miles away.

The ever changing form of Bogoslof has been recorded by many vessels. During recent years, beaches connecting the newer and older parts of Bogoslof have appeared, disappeared and reappeared. The writer has observed marked changes during successive visits.

Bogoslof has been a stronghold of the sea birds from the beginning, but the bird tenants must have been ejected often with great violence. On the rough volcanic pile the birds nest almost anywhere. While there are portions of

the volcano from which they are excluded by clouds of steam and sulphurous vapors, they nest so close to such areas that the eggs in some places are doubtless warmed as much by the volcanic heat of the rocks as by the sitting birds. I have climbed among nesting guillemots where the rocks were heated enough to warm my chilled fingers. There are enough dead birds in some places to show that they often fly too close to the danger zones, not always being able to discriminate between hot steam or poisonous vapors, and the dense fog banks that drift about the island. Nevertheless they multiply amazingly and their numbers can only be described as myriads.

The guillemot makes no nest, laying its large single egg on any ledge wide enough to hold it, so that the egg comes in direct contact with the rock. The great mass of the birds of Bogoslof are guillemots, (*Uria lomvia arra*), but there are a few puffins and kittiwake gulls. Perhaps the scarcity of nest-building birds can be explained by the total lack of nest-making materials such as grasses and dry seaweeds. Bogoslof has neither land nor sea vegetation and is unique in this respect as compared with other bird islands. The guillemots hold almost undisputed possession, while on other bird islands of the region they share the cliffs with puffins, fulmars, kittiwakes, auklets, cormorants and other nest builders. Birds like puffins, fulmars and auklets, seeking deep crevices for their nests, would have a hard time on Bogoslof where deadly vapors may ooze forth almost anywhere.

The numbers of guillemots to be seen on the rocks at a given time do not indicate the actual



GUILLEMOTS ON THE HEIGHTS OF BOGOSLOF



A STEAM-SWEPT BIRD ROOKERY ON BOGOSLOP VOLCANO, BERING SEA



GUILLEMOT FROM BOGOSLOF VOLCANO

bird population. There are such numbers on the wing, or on the surface of the sea, at the same time, that the observer visiting the island soon decides that most of the guillemots are not at home.

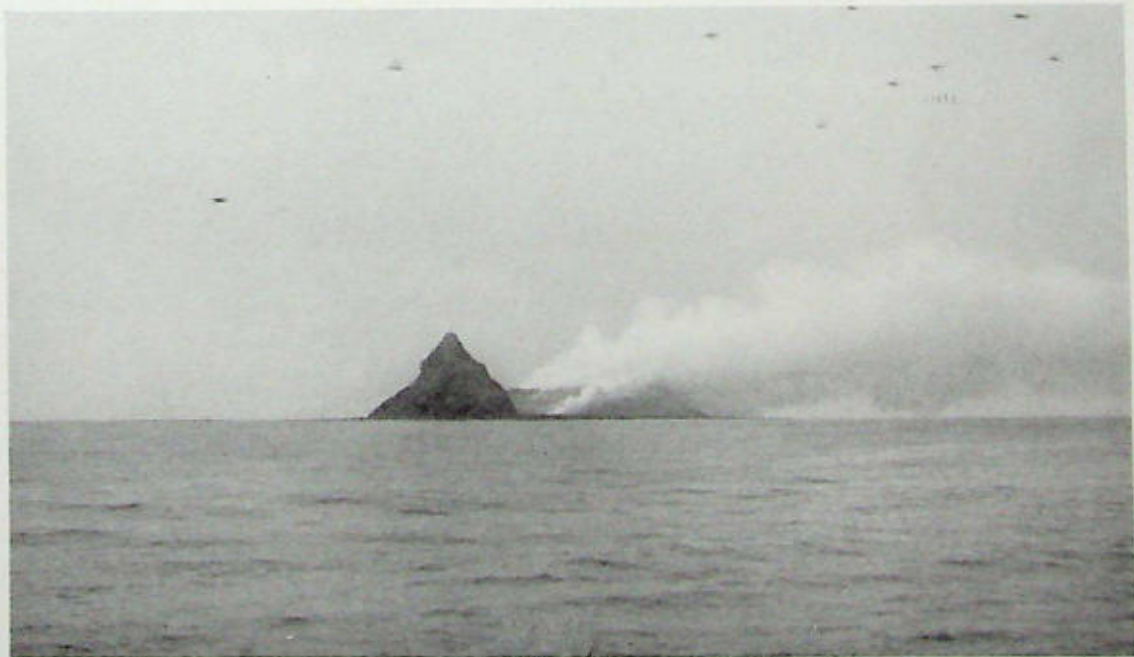
They cover the adjacent waters everywhere and keep flying off shore in bands so great that the island seems to be encircled with a wide belt of swiftly moving birds. They meet the approaching ship when still miles away, and are so numerous in the water that they scarcely keep clear of the oars of the landing boats.

The guillemot is a staple in the food supply of the Aleutian and Pribilof natives. The thick, meaty breasts are wholesome and palatable, and one soon gets used to eating them. As the supply of birds is large, it could be drawn upon for war time food in case of necessity. It ought not to take long to load a refrigerator ship with guillemots at Bogoslof.

#### THE SPADEFOOT TOAD

*By* IDA M. MELLE

**T**HE spadefoot, though one of our common toads, is least often seen because of its habit of spending a large portion of its life—perhaps a couple of years together—underground, and coming forth, as a rule, only during the night. Great humidity is required to



DISTANT VIEW OF BOGOSLOF VOLCANO



SPADEFoot TOADS

draw the spadefoot out of the ground by daylight for better air, and then it protrudes only its round, sleepy head with the eyes closed, looking more like a dirty red pebble than a live animal.

Its eyes, being vertically pupiled like a cat's, are fitted for seeing better in the dark, and it appears blinded by day. It troops forth in great numbers in the springtime, however, and takes to the ponds like other toads, to breed. Though the spadefoot is even a trifle smaller than the common toad, it is said at this time to make more noise than the bullfrogs.

For purposes of observation at home, the hardy tadpoles of the spadefoot toad are most interesting. The under surface being transparent, reveals the beating of the heart, the long intestinal coil, and nearly the whole physiology of the animal, without need of dissection or magnification. In a few weeks after hatching—which generally occurs the day after the eggs are laid—the legs, beginning with the hind ones, push gradually through the skin, and the tail is absorbed when the tadpoles are about five weeks old.

The pollywog eats nothing during the few days when its tail is being dissolved by blood and lymph and phagocytes, for the tail thus taken into the body serves to nourish it while the little creature is losing his round, sucking mouth and acquiring a new large one with teeth in the upper jaw and otherwise getting ready for the approaching, wonderfully different life on land. His auburn jacket is exchanged for a brown land coat, preparatory to assuming the reddish aspect of the adult.

Most of the tadpoles are content to wait till their tails are gone before seeking the new world, but a few—about one in seven—are so

eager for terrestrial life that they set out, tails and all.

The name spadefoot is derived from small, bony protuberances on the hind feet, that are thought to assist like a spade when the toad burrows. A few digs with his hind feet, and back he slides into the earth as though sinking in quicksand.

The eggs of the spadefoot are laid like those of frogs in jelly-like clusters or masses, and not in the polka-dot strings peculiar to most toads.

#### NEW PAINTINGS SHOWING THE COLOR CHANGES OF FISHES.

**I**N an article published in the *Report* of the Zoological Society, in 1909, the director of the Aquarium described the instantaneous changes in color practiced by many of the tropical fishes exhibited there. It was illustrated by such photographs as it was possible to make, showing the changes that take place, but these were few in number and in no case presented more than two or three of the color phases which the fishes are capable of assuming.

A few months ago the Executive Committee provided a fund for the painting of some of the species conspicuous for their changes in color and markings.

One of the fishes much given to masquerading in different guises is the spade fish, (*Chaetodipterus faber*). Although without brilliant colors of any kind, its three shifts from black to white are very striking and are well shown in the accompanying photographic reproduction of Mr. Murayama's painting. The change from one phase to another may occur at any moment.

A tropical fish may exhibit all of its various garbs within an hour, or may do nothing inter-



THE SPADE FISH. (*CHAETODIPTERUS FABER*)

Showing three phases of color, any one of which it can assume instantly. From a painting by H. Murayama.

esting for several hours. In order to keep the record of the brush going without waste of time, the artist keeps two or three species under observation at once, using a separate canvas for each. When one species refuses to perform, another in an adjoining tank may be more accommodating, and the artist has merely to turn to the other easel.

In this way the finny masqueraders are all caught eventually at their tricks. Sixteen species have already been painted in the various transformations which they are capable of making, in one case eight changes in color being shown.

It is proposed that these pictures be published in color by the Zoological Society, together with the results of recent observations on the color changes of fishes.—C. H. T.

#### A BLUE LOBSTER

THE Aquarium has a specimen of the American lobster which is so remarkable that it would attract instant attention anywhere. It is not only a giant among its kind, weighing over thirteen pounds, but has a brilliant blue color.

It has been intimated that the color of our specimen is a forgery, but the lobster was received alive on June 30, and has been seen by thousands of persons. When it died an artist was engaged to make a painting of it before any change in color could take place. It has been handsomely mounted, and whatever color was lost in the process has been restored from the original color sketch.

This lobster as mounted, with the large claw in a curved position, is twenty-nine inches long, and must have been at least thirty-two inches before mounting. It will be exhibited beside another mounted lobster which died in the Aquarium, having a length of thirty-eight inches and a weight of twenty-one pounds.

Incidentally the largest known lobster, weighing thirty-four pounds and now in the American Museum of Natural History, died in the Aquarium.

Blue lobsters have long been known, but are of quite rare occurrence. There are a few descriptions of such specimens in the literature of the lobster, and the Aquarium has received blue lobsters at different times, some of them sent from distant points as great rarities.

Our large blue lobster is, like most of those described, of an intense indigo blue above, shading into a clear blue on the sides and under

parts. The color is merely the result of some unusual condition of the shell pigments.

It was presented by Mr. Edward B. Tuthill, of Montauk, Long Island, and presumably was captured in that region.—C. H. T.

#### SOME NOTES ON THE WEAKFISH

(*Cynoscion regalis*)

By W. I. DENYSE

THE weakfish is one of our most common food fishes, and is caught in far greater quantities than the bluefish. It makes its appearance in this locality about the first week in May and remains until the beginning of November, when it leaves for the south. It arrives in scattered numbers, only a few being caught by the fishermen until about the first of June, when large catches are made and this continues until the fish migrate in the fall, although there may be weeks of poor fishing between their coming and departure, owing to weather conditions.

In its feeding habits, the weakfish is nearly as voracious as the bluefish, and the larger specimens, weighing from fifteen to twenty-five pounds, are very destructive to young fish. They even will eat the young of their own species, a trait that I never have known the bluefish to display. Very large specimens seldom frequent the shallow water bays, though those of small and medium size do so. They enter the bays with the flood-tide in search of food, and swim among the beds of eel grass, feeding on shrimps, small fish, worms and small crabs. Many blue crabs just out of the shell and in the soft stage, are eaten by them. Often, I have found the stomachs of medium-sized weakfish to contain shrimp, small blue crabs, rock crabs, minnows, spearing, tomcod, blackfish, sea bass, striped bass, mullet, herring, menhaden, bluefish, anchovies, sand lance, marine worms of different species, and on several occasions, young weakfish.

Though the weakfish is quite as much of a gormand as the bluefish, I never have seen it destroy fish after its appetite had been satiated as the bluefish do. It is a well-known fact that when bluefish have eaten till they can hold no more, they will swim among schools of small fish and cut them to pieces with their strong teeth and jaws.

In the fall of 1886, I had the pleasure of seeing schools of large weakfish on the surface of the water off the Sandy Hook Light Ship, so

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 ZOOLOGICAL SOCIETY BULLETIN
 

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## Departments:

<i>Mammals</i>	<i>Aquarium</i>
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<i>Birds</i>	<i>Reptiles</i>
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Published bi-monthly at the Office of the Society,  
111 Broadway, New York City.

Yearly by Mail, \$1.00.

MAILED FREE TO MEMBERS.

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ELWIN R. SANBORN,

Editor and Official Photographer

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VOL. XX No. 6

NOVEMBER, 1917

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gorged with food that they were scarcely able to move or swim beneath the surface. We sailed among them, towing squids astern, but they failed to bite, only one being hooked in the stomach and brought aboard.

We then launched a small boat from the yacht, and went among them, armed with two gaffs, succeeding in gaffing twenty-five that weighed on an average twelve pounds each. Our small boat, with the combined weight of two men and the fish, had aboard about six hundred pounds, and we were compelled to return to the yacht and unload for safety.

We then made grapples by tying three long-shanked bluefish hooks together and attaching a bluefish line and an eight ounce sinker to each grapple. Again we cruised among the fish and caught thirty by casting our grapples and hauling the line in rapidly, hooking them in various parts of the body. Every cast did not reward us with a fish, but with four men casting the returns were frequent. We were two hours among the weakfish before they sank, and observed about four acres of them on the surface at one time.

THE MULLET  
(*Mugil cephalus*)

By W. I. DENYSE

THE common mullet is found on the Atlantic Coast from Cape Cod southward and generally moves in very large schools.

The first mullet make their appearance in this locality about the fifteenth of June and are usually young specimens traveling in small schools of two or three hundred. About the first of September larger mullet are seen asso-

ciating with the smaller ones, and the schools also increase in size, comprising several thousand. The mullet is much sought after by the local seine netters, for when a catch of them is made, it is always large, several tons being taken; and they sell very well in the market. The mullet caught in this vicinity are small fish, running three to the pound. Occasionally larger ones are taken, weighing two or three pounds. Fishing for mullet with a seine is very exciting work. The seiner must be quick with his boat and row fast to circle a school, and after the school is surrounded, the mullet will escape the fisherman unless he gets the ends of the seine ashore quickly. Then, too, after the net is well up to the shore, the fish commence to jump over the cork line, sometimes leaping in such numbers that the eye cannot count them; yet a great many are saved from the haul by the net. If a second seine is placed around the one containing the fish, no mullet will escape over the second, and many a fisherman, by this maneuver, has scored a good day's work.

The mullet is a very oily fish, and only a small quantity can be eaten at a meal by most people. Immense numbers are salted in the south, and sold in the Southern and Middle States.

"It is the most generally popular and most abundant food-fish on our southern sea-board. Its abundance puts it within the reach of everybody, blacks as well as whites.

"The mullet is a bottom-feeder, and prefers still, shoal water with grassy and sandy or muddy bottom. It swims along the bottom, head down, now and then taking a mouthful of mud, which is partially culled over in the mouth, the microscopic particles of animal or vegetable matter retained, and the refuse expelled. When one fish finds a spot rich in the desired food, its companions immediately flock around in a manner reminding one of barn-yard fowls feeding from a dish."

The mullet makes good bait for catching almost all kinds of fish, and is much sought after by anglers. In this locality they often hibernate, and are caught in winter by fishermen spearing for eels beneath the ice. They lie on the bottom in the soft mud from twelve to fifteen inches below the surface, just above the eels that always go deeper. The writer has taken mullet with the eel spear through holes cut in the ice in Hog Creek, Sheepshead Bay, Long Island. One winter, in particular, large catches of them were made at this place by eel spears.

SABLEFISH, (*ANOPLOPOMA-FIMBRIA*)

Taken on the U. S. Fisheries Steamship *Albatross*. Photographed by C. H. Townsend.

### THE SABLEFISH

A NEW NAME ON THE BILL OF FARE

By C. H. TOWNSEND

COMMENCING with the exploitation of the tilefish in 1915, the Bureau of Fisheries has continued to render an important service to the country in making known the good qualities of several fishes that have long been overlooked in the fishing industry.

The list includes the tilefish, grayfish, burbot and sablefish. The last being a Pacific Coast species, is not yet well known in eastern markets; but it has commenced to figure in official statistics of the fisheries.

During the six months ending June 30, 1917, there were landed at Seattle, Washington, 1,033,980 pounds of sablefish valued at \$39,697. This is making remarkably good progress, considering that the campaign to popularize the consumption of sablefish was inaugurated in January.

Readers of the BULLETIN will be interested in seeing what this fish looks like. Its cod-like appearance is well shown in the accompanying photograph made by the writer on board the U. S. Fisheries Steamship *Albatross* in 1891 when attached to that vessel in the investigation of our northwest coast fisheries.

The thirteen fishes shown had an average weight of twelve and one-half pounds—the largest weighing twenty-eight pounds and having a length of fifty-one inches. They were taken on trawl lines set in the Straits of Fuca, at a depth of 125 fathoms. We met with sablefish at many points between Oregon and the Alaska Peninsula, and a few specimens have been taken as far south as Southern California. It has been taken by fishing vessels west of Queen Charlotte Island in 250 fathoms of water, which is rather deeper than American fishermen care to operate, although the Japanese fish habitually in even greater depths.



PORTUGUESE MAN-OF-WAR, (*PHYSALIA ARETHUSA*)

The picture shows the animal feeding on an anchovy. The minute stinging cells are visible as small dots on the more thread-like tentacles.  
Photographed by L. L. Mowbray.

The sablefish is one of the best of food fishes, as the writer can testify from many months' personal experience with it. Judging from the number consumed by the eighty men comprising our ship's company, it is a safe fish for anyone to buy if it should appear in our eastern markets.

The attendance at the Aquarium to November 1, was 1,457,244.

## THE PORTUGUESE MAN-OF-WAR

By C. H. TOWNSEND

**T**HIS Portuguese man-of-war, (*Physalia arethusa*) is an inhabitant of the warmer parts of the Atlantic, but is carried far northward by the Gulf Stream and often drifts ashore along our coast.

It is the most conspicuous of the jelly-fishes, as its air-filled float is sometimes more than six inches in length, and has along its top a highly colored crest or sail which can be lowered at will. Beneath are many tentacles and protruding mouth parts.

According to Mr. L. L. Mowbray of the Aquarium staff, it appears about the Bermuda Islands in vast numbers in February, March and April, after prolonged southerly winds, the sea being literally covered with them. Great numbers are driven by winds into the bays and stranded on the beaches. East of the Bermudas, he has sailed through areas that were thickly covered with them for 150 miles.

The tentacles of the Man-of-war can hold fishes over six inches in length, although usually taking those of smaller size. It of course takes hold of anything with which its long tentacles come in contact, and as the tentacles can stretch down forty or fifty feet, all sizes of fishes may be entangled. The largest fishes doubtless break away. The tentacles are covered with stinging cells which soon weaken and

disable its prey. They are then gradually drawn closer to the body, where the numerous protruding and disc-tipped stomachs seize and absorb the soft parts, leaving the bones and scales almost intact. The sting of the tentacles is instant and painful to the human hand.

There is a species of small fish, (*Nomeus gronovii*) known as the Man-of-war pilot, which is apparently immune to the paralyzing

touch of the tentacles, as it lives habitually under their shelter. Several of these fishes may accompany a single Man-of-war. When disturbed by larger fishes they seek refuge among the trailing tentacles, where pursuing fishes often meet their fate. The remarkable immunity of the pilots may be due to some secretion of the fish which actually prevents the adherence of the stinging cells of the tentacles, as the fishes dart freely among them for protection.

The writer has taken many of them with a long-handled dip net when cruising with the Fisheries Steamer *Albatross* in the Gulf Stream. As many as ten of these little fishes have been secured in lifting a single *Physalia* from the water.

C. H. T.

#### THE HERMIT CRAB (*Petrochirus bahamensis*)

By L. L. Mowbray

From some primitive kind of crustacean which discovered the advantages of a portable shelter has been derived the hermit crabs. The largest of the marine hermits is found in Bermuda, Florida, and the West Indies.

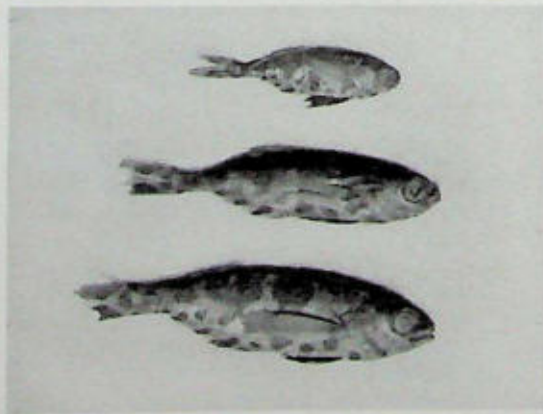
The name hermit or soldier crab is of ancient date and is applied to this ensconced crustacean



HERMIT CRAB OF THE WEST INDIES

Photographed by L. L. Mowbray.

as it resembles a hermit in his cell or a soldier in armor. It was long doubted if the hermit would actually attack an animal in its shell for the purpose of obtaining a suitable dwelling. This fact has been well established, and after the animal has been killed the hermit will eat it. One of the most interesting things in the hermit's life is to watch it examining an empty shell before entering it. A short while ago I made some moving pictures of the life of the hermit crab and after showing the crab in its shell I removed it and showed the animal walking about in an aquarium without its house. An empty *Strombus* shell was then placed in the aquarium and the hermit approached it with caution, circled it and then turned it over so that the lip was up, and with the greatest caution crawled over it inserting its large biting claws into the shell and gradually going in further and further until it was perfectly satisfied there was nothing therein. Making a quick turn of the body, it thrust its tail into the shell, moving about three or four times to the right and left, and after satisfying himself that the shell would answer the purpose, proceeded to move away, of course, dragging the shell with it. It is necessary for the hermit to change its shell frequently. As it grows it must have a larger covering, and sometimes it so happens that it cannot find a suitable shell and will take anything that it can get into and carry away. I have seen them carrying an enamel can, the bowl of a clay pipe or a small bottle.



MAN-OF-WAR PILOT, (*NOMEUS GRONOVII*)

From alcoholic specimens. Photographed by L. L. Mowbray.

While writing this article two hermit crabs were fighting in the aquarium tank where there are a dozen or more specimens. The victor lost his right biting claw in the fray and without showing the least concern drew the body of the victim out of the shell and ate the softer parts. It was impossible to get a picture of the fight owing to the lateness of the hour.

### THE WATER BEAR

By IDA M. MELLETT

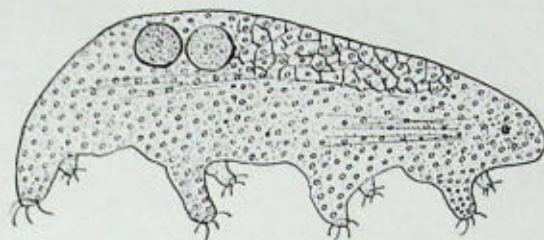
THE most elusive animal in the world, and, if we omit the horse shoe crab, (*Limulus*) and the headless fish, (*Amphioxus*), perhaps the most remarkable, is the water bear, Tardigrade.

The horse shoe crab and the headless fish are not so difficult to obtain and place under observation, but a microscopist may look for a water bear many moons ere his search will be rewarded; and then, though he give it but a teaspoonful of water to roam in, he may not find it a second time—so extremely minute is the alluring creature.

After several years of intermittent microscopy, I found a water bear. She favored me with her presence two days and on departing left a souvenir of inestimable value,—her old skin with two eggs inside, and these hatched. She measured not more than 16/1000 of an inch, and her offspring were, of course, considerably smaller.

Tardigrada, meaning slow walker, is not the most appropriate name that could have been bestowed. It does not convey the impression of perpetual motion which one receives on viewing the animals. The eight tiny feet never rest, their long claws grasping at everything near them as their owner incessantly works his way about.

Except for twice too many feet and no tail, the Tardigrade slightly suggests the bear in its aspect and is therefore commonly called water bear and bear animalcule. Some of its early describers—a popular notion then prevailing that bears lick their cubs—hazarded the guess that it resembled an unlicked bear cub. As a matter of fact, no one knows whether bears lick their cubs or not, since the she-bear (as I am informed by Mr. Hollister of the Washington Zoo) retires into complete seclusion for six weeks when the young are born and would kill them if disturbed, at least during the first few days; and there is really no known animal to



THE WATER BEAR

From a drawing by Ida M. Mellen.

which the Tardigrade may be likened with certainty.

In the matter of classification, it has been called an animalcule, a crustacean, a worm, and a spider. While it lives amicably with protozoa, flat worms, rotifers and snails, it is zoologically evasive and something of an aristocrat, refusing to be closely associated with any other animal, yielding to no real grouping at all, but occupying a separate heading all by itself—at present near the spiders—under the large order of jointed-footed animals. This is rather awkward, because there are no joints whatever in its feet, and latest rumor is that it will next find itself back among the worms, from which group of animals it is now thought to be an offshoot.

The Tardigrada are remarkable creatures; not only remarkable to look upon, but wonderfully put together. They are male and female. Besides head, feet and claws, they possess a mouth, pharynx, œsophagus, teeth, stomach, muscles, and sometimes eyes—but never any tail. The body is composed of beautiful, regular cells that delight the physiologist, especially the student of histology, the science of the tissues; yet the Tardigrade possesses no connective tissue. It has a brain, a nerve cord, a chain of ganglia, and optic nerves, and an organism that exhibits no signs of degeneration; yet the animal boasts neither lungs, gills, kidneys, heart, nor blood vessels.

Certain bacteria and other vegetable organisms have been observed flourishing in its body fluid, but work no apparent injury to their busy host. Outwardly it appears defenseless. Its teeth are used only on the plants it eats, and its claws are never set in the hide of friend or foe, so far as we can ascertain, but serve only to grasp surrounding objects to help the tiny creature over his watery ground; but the salivary glands are said to secrete poison.

Europeans first recorded the Tardigrades and described species that live in salt water as well as fresh. The fresh-water species has generally

been found in plankton—the floating matter of the water—in wet moss, and other small plants of the rivers, swamps and ponds. Low temperature is evidently pleasing to the water bears, for, rare at all times, they are still more rarely found in summer than during the cooler months.

In Illinois they have been observed from October to May. The one here pictured was found toward the last of May in a balanced aquarium where she had probably been all winter, having taken up her abode for the time being with various other minute animals in the dead egg of a red ramshorn snail. There it was that she cast her skin and left her progeny. The latter's small feet traveled around and across the egg a great many times. An egg  $1/32$  of an inch in diameter was, of course, a little world in itself—a microcosm—to such infinitesimal creatures. They showed no haste to leave it and seek their fortunes in the deep, expansive lake wherein the egg reposed—in a watch crystal.

Another specimen, since discovered in August, was groping among the stems of some stalked protozoans attached to the shell of a Potomac snail.

Some of the bear animalcules live on land, and on the roofs of houses, others in moist sand. Some live only in temporary pools, others in the seething ocean; and far removed from civilization, still others dwell high up in the Arctic mountains. Some travel about in tiny coats of mail. One species—that which lives in moss—suffers no permanent injury from drying up, surviving terrible heat and drought. It is said that even after years of dessication, a drop of water will bring it to life. Without heart or blood vessels, the fluid in the body which serves as blood need not necessarily be peculiar to this Tardigrade; and perhaps that is the queerest thing about him. When it has dried up, a touch of moisture will replace it and serve quite as well. During drought, therefore, the members of this species remain like invisible particles of dust. A drop of rain, and back to life they come.

The restlessly active little water bear has his place somewhere in the great scheme of life on earth, self-intent and self-content, and quite unaware that he has been found out by giants studying zoology, whose infinitely larger brains than his are so severely taxed to discover what manner of beast he is. "Solicit not thy thoughts with matters hid."—Little did Milton know the temptations of the microscope.

## ITEMS OF INTEREST

By C. H. TOWNSEND

*A New Book on Small Aquaria.*—In Goldfish Varieties and Tropical Aquarium Fishes, Mr. William T. Innes presents a useful guide to aquaria and related subjects. Among the subjects dealt with are the fresh-water aquarium, goldfish varieties, hardy native fresh-water fishes, tropical aquaria, marine aquaria, terraria, fish foods, diseases, plants, construction of aquaria, etc.

The author is equipped by long experience for his task, and has performed it so well that the book will take an important place among manuals devoted to the subject.

The following quotations contain the essentials of aquarium management:

"The main causes for failure, in the order of their importance, are overcrowding, overfeeding, sudden temperature changes, lack of proper plant life, insufficient lighting."

As to overcrowding, the rule given is:

"One inch of fish to one gallon of water—that is, in a ten-gallon aquarium of the usual oblong shape, well planted and in a good light, one could successfully keep ten one-inch, or five two-inch, or two five-inch fish.

"Fish should never on any account be fed more than will be consumed at once.

"Do not subject the fishes to any sudden change of temperature, either higher or lower . . . A sprinkling pot is excellent for adding water to the aquarium.

"If oxygenating plants are not used the fishes become restless, come to the surface to breathe air, and may finally die of suffocation unless the water is changed.

"Select for the aquarium a place close to a window with a good strong light, preferably one where it will get two hours of direct sun a day."

In conclusion, the author gives a list of very sensible Don't's, which, if well considered by the amateur, ought to carry him far on the way to success.

The book is well printed, well illustrated, and its matter is well presented. Undoubtedly it will introduce many to the pleasant art of keeping aquaria.

*Larger Exhibition Tanks.*—The picture of sturgeon and dog shark shows the effect that can be produced in the enlarged exhibition tanks that have been constructed in the Aquarium during the past two years. The work of enlarging tanks will be resumed soon and it is



YOUNG ORANGE FILEFISH, (*Acanthurus nigrofasciatus*)  
Photographed by Edwin R. Sabin.

hoped that all of the glass-fronted tanks on the ground floor will be large enough to hold really large fishes. The number of fishes that can be kept in such tanks is greater, as there is more swimming space.

*Young Orange Filefish.*—The young of this species are quite different in appearance from the adults, having oblique, broad black bands, while the adults lack the bands and are conspicuously yellow. The photograph of the young filefishes presented herewith may be compared with one published in this BULLETIN in November, 1912, showing the large adult fishes.

This species usually maintains an oblique position both when quietly poised in mid-tank and when moving in its slow fashion. It is common all along our coast in summer and autumn and is often found in large schools.

*Refrigerating Plant.*—One of the most important improvements in the mechanical department of the Aquarium has been the recent installation of the refrigerating engine and condenser in new quarters.

To comply with Fire Department requirements for the separate enclosing of such machinery, it became necessary to remove the refrigerating plant to a position where the accidental liberation of ammonia gas would not be dangerous to visitors. This was accomplished by the construction of a room outside of the engine room, on top of the broad outer wall of the building. Advantage was taken of the change, to abandon the bulky tank and coil system and install a condenser of the more modern double-tube pattern, which requires less space and gives better results.

The accompanying photograph shows the exterior of the new structure. The area made vacant by the removal of this machinery permitted the enlargement of two exhibition tanks and the consequent increase of space to be devoted to exhibits.

*Fishes From Florida.*—On September 12 Mr. Mowbray of the Aquarium staff, went to Key West for the purpose of making a cooperative collection of fishes for the New York and Detroit aquariums.

The collection was made under very trying conditions, owing to stormy weather. About 600 specimens were collected and were loaded on the steamer in a gale of wind and rain. The ship was delayed several hours, owing to the weather, but sailed that night. The gale reached its height about midnight and the fishes in the shipping tanks were subjected to uncommonly



NEW QUARTERS FOR THE REFRIGERATING PLANT

rough treatment. Some 160 succumbed or were too badly bruised to be of any exhibition value and were thrown overboard; but 447 specimens finally landed at the Aquarium.

*Fur Seal Herd in 1917.*—The preliminary census of the Alaska fur seal herd for 1917, as reported from the Pribilof Islands on August 16, totaled 463,374 seals of all classes.

A steady increase in the herd has been recorded each year since ocean sealing was discontinued by international agreement in December, 1911. The catch made at sea that year was 12,700, mostly breeding females, and the herd on the islands was numbered at 123,600, although it was subsequently announced that this figure was too low. In 1912, with no losses of breeding females from ocean sealing, and no losses of pup seals by starvation as a result of being left motherless, the herd numbered 215,738; the census having been made with greater care than ever before.



AN AQUARIUM OF FORTY YEARS AGO  
From an old print owned by the N. Y. Aquarium.

The total for 1917 shows that the herd has more than doubled in five years, and the half million mark is almost in sight.

The number of breeding females is ascertained each year by actual counting of pups born, the number of which for 1917 is announced as 125,712.

In five years more the seal rookeries of the Pribilofs will begin to look like old times.

*An Aquarium of Forty Years Ago.*—The picture of the "Great New York Aquarium," shown herewith, is from a large lithograph now in the library of the Aquarium in Battery Park.

The Aquarium, located on the corner of Broadway and Thirty-fifth Street, was founded by W. C. Coup, and was opened to the public on October 11, 1876. Shortly after the project was set on foot, Messrs. Charles Reiche & Brother, dealers in animals, became associated with Mr. Coup, who later withdrew and was succeeded by Dr. H. Dorner, of the Hamburg Zoological Garden and Aquarium, who became manager.

The Aquarium contained 16 large glass-fronted wall tanks, and 12 large table aquaria for marine exhibits. In addition to 14 table aquaria for fresh water exhibits, there were a large trout tank and two fish-hatching troughs. The fresh water supply was derived from the City system, and the sea water was circulated by a steam pump from a reservoir under the floor.

A guide to this Aquarium by Dr. Dorner, published in 1877, "describes nearly all the animals that have been or are on exhibition." It enumerates 132 species of fishes, a small number of invertebrates, and a few aquatic vertebrates such as turtles and salamanders. There were three floor pools usually devoted to seals and alligators. One of the pools was occupied for a short time by a white whale, (*Delphinapterus leucas*).

Mr. W. I. De Nyse, now of the staff of the Aquarium, was connected with the Broadway institution for three years. He states that at first the Aquarium was successful financially, but later its exhibits were not well kept up and the interest of the public declined. The

central floor space was finally cleared of aquatic exhibits to make room for vaudeville attractions; but the favor of the public was not regained, and the Aquarium soon ceased to exist.

*Huge Snapping Turtles.*—The Aquarium has received from Louisiana three specimens of the alligator snapping turtle, (*Macrochelys lacertina*), one of them unusually large, weighing 101½ pounds.

Their weights and lengths are as follows:

- 1.—101½ pounds, carapace 24 inches, total length 4 feet 9 inches.
- 2.—87 pounds, carapace 27 inches, total length 4 feet 9 inches.
- 3.—70 pounds, carapace 21 inches, total length 4 feet.

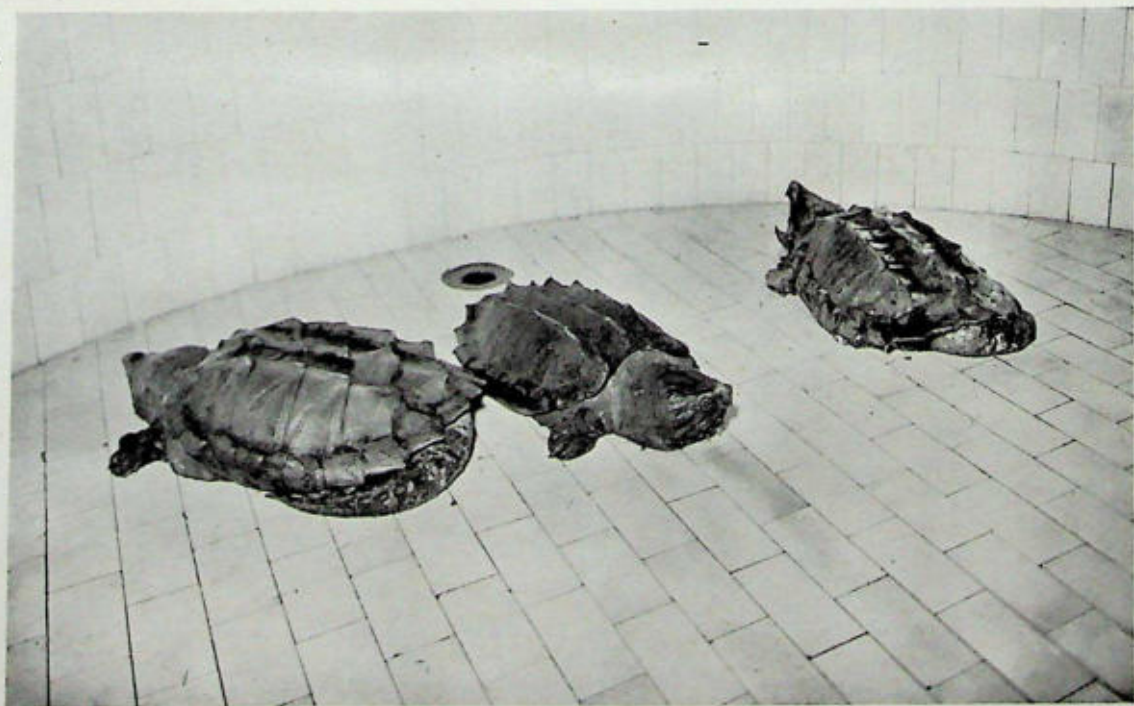
A very large mounted snapper of this species from Memphis, Tennessee, that died in the Aquarium some years ago, weighed 106 pounds. Its total length was four and one-half feet, and the length of carapace twenty-three inches.

These large and vicious turtles inhabit the lower Mississippi and rivers of the Gulf States. They are the largest of the fresh water turtles with the possible exception of the *Podocnemis expansa* of the Amazon River.

The greatest known weight of a *Macrochelys lacertina* is 140 pounds. It is used as food and often sold in southern markets. The powerful jaws can break a stick the size of an ordinary broom handle.



ONE OF THE NEWLY ENLARGED EXHIBITION TANKS  
Showing common Sturgeon, (*Acipenser sturio*) and smooth Dogfish, (*Mustelus canis*).



GIANT SNAPPING TURTLES FROM THE LOWER MISSISSIPPI  
Photographed by Elwin R. Sanborn.



SECTION OF A FUR SEAL ROOKERY

Photograph made twenty years ago by C. H. Townsend.

## TWENTY-FOUR WAYS OF SPELLING A FISH'S NAME

FORMERLY a man was not considered accomplished unless he could spell his name several different ways. Even in his will his utmost versatility was displayed in this respect—a procedure which would, in all likelihood, invalidate the document under modern process of probate. Sometimes each of the children spelled the name a different way, and in some of the old New England graveyards several variations occur in the stones of a family plot. The irritation of people nowadays when their names are not spelled in precisely one way, is an amusing illustration both of the reversal of fashion and the hold that fashion has upon us.

In the naming of a certain fish, however, the old custom still prevails, and our ancestors are quite outdone in the case of this giant pike whose name is spelled in at least twenty-four different ways:

### Ways beginning with *Ma*

Mascalonge	Maskallonge
Mascolonge	Maskalonge

Maskalunge	Maskinoje
Maskanonge	Maskinongé
Maskenonge	Mask-Kinongé
Mas Kenosha	Masquallonge
Maskenozha	Masquinongy

(Of these, Mas Kenosha, Maskinongé and Mask-Kinongé are names given to the fish by the Ojibway Indians.)

Way beginning with *Mo*  
Moska longe

Ways beginning with *Mu*

Muscalonge	Muskallunge
Muskalinge	Muskalonge
Muskallonge	Muskellunge

Way beginning with an *N*  
Noscononge

And it is written in French *Masque longue*, also *Masque allongé*—that is to say, "long face."

The question of a settled form for spelling the name of this fish was considered at the Aquarium several years ago, and Muskallunge was decided upon. This spelling has been used ever since in Aquarium publications.

I. M. M.

