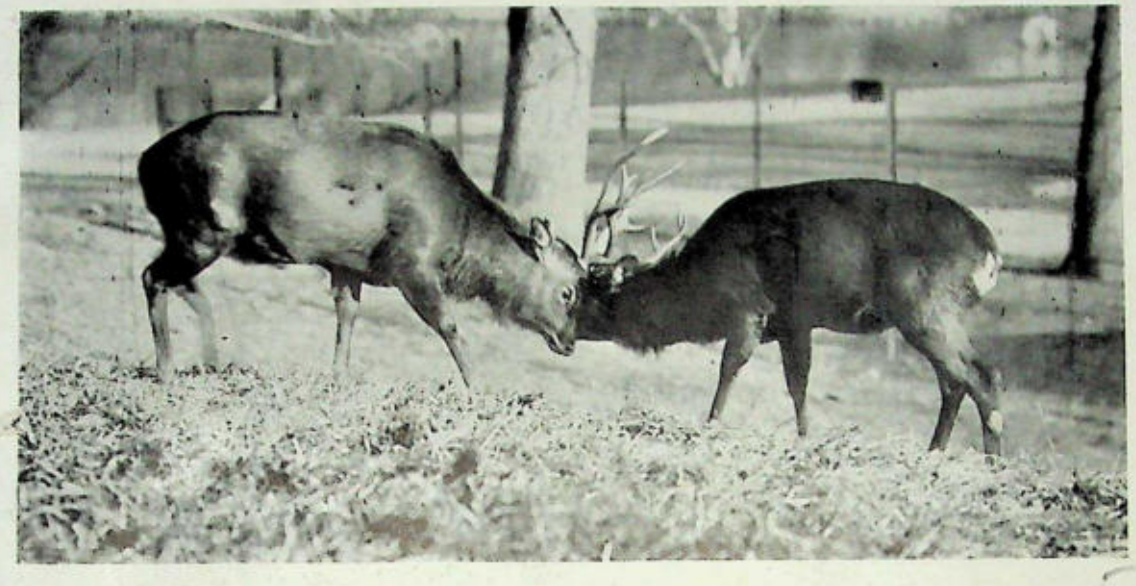


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ZOOLOGICAL SOCIETY BULLETIN

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YOUNG FEMALE CHIMPANZEE SUSIE

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ZOOLOGICAL SOCIETY BULLETIN

Published by the New York Zoological Society

VOL. XVII JANUARY, 1914 NUMBER 1

A RESULT OF OUR VICTORY OVER THE FEATHER TRADE

DURING the recent struggle in the United States Senate for the exclusion of wild-bird millinery, the friends of the birds persistently maintained that the closing of our market would inevitably result in a marked diminution in bird slaughter. We claimed that with our ports tightly closed, the quota of birds annually slaughtered for the American market hereafter would not be killed. We did not, however, anticipate the quick confirmation of our views that has reached us.

From Mr. James Buckland, of London, one of the foremost champions of the birds against the British feather trade, we have received a set of the catalogues of the London feather auction of October 14, 1913, carefully annotated as to sales, prices and withdrawals from sale. They show that exactly ten days from the signing of our tariff law by President Wilson, the London feather market suffered a tremendous decline. Out of 1174 lots that were offered, 368 had to be withdrawn, because of bad prices and no buyers.

It is with much interest that we have made a complete summary of the contents of the principal lots that had to be withdrawn because of the closing of the American market. The list is as follows:

SKINS AND FEATHERS UNSALABLE IN LONDON ON OCTOBER 14, 1913.

1203	skins of	Greater Bird-of-Paradise.
127	"	Rifle Bird-of-Paradise.
761	"	Emu.
1212	"	Eared Pheasant, ("*Numidi*").
1237	"	Lady Amherst Pheasant.
790	skins of	Golden Pheasant.
142	"	Impeyan Pheasant.
105	"	Pelican.
318	"	Marabou Stork.
22810	"	Kingfishers.
173	"	Scarlet Ibis.
3321	"	Terns, ("White Sea Swallows").
400	"	Gulls.
30	"	Owls.
308	"	Cockatoo.
1759	"	Parrot.
2494	ounces	Egret plumes, (and some Heron), = 14,964 birds.
17402	wing and tail feathers of	Condor.
1993	" "	Eagle.
34681	" "	Hawk.
544	wings of	Macaw.

Today, Germany is much disturbed by the contest between the defenders of the birds and the German millinery trade. Professor C. G. Schillings is vigorously agitating, but he is harassed by lack of funds, and apathy on the part of many German ornithologists and zoologists. Apparently the German zoological societies are doing nothing; and on the other hand, the millinery trade is well organized, well financed and ably led. The apathy of the bird-lovers of Germany is truly amazing. As in England, the feather trade is seeking to throw dust in the eyes of the people by solemn talk about "experimenting" and "colonizing" and "breeding" plume birds for the feather trade. This may deceive many ignorant persons, but all those who know something about wild birds are well aware of the fact that years before any such experiments could by any possibility succeed, the wild "plumage" birds would all be dead—unless given absolute protection immediately.

The Director of the New York Zoological Park has addressed to the Royal Zoological Society of Amsterdam (of which he is an honorary member) a lengthy memorial, urging that powerful Society to inaugurate a campaign to induce the Dutch Government to at once forbid by imperial decree all exportations of wild birds' plumage from all the islands of the Dutch East Indies. The memorial was submitted to the council of the Society, and a committee was immediately appointed to take steps to secure the end desired. Its first official act was to cable a request for copies of all the literature of the recent struggle in America, and of the resulting law.

If the Netherlands Government should decide to take the action suggested, it would electrify all Europe, and deal a staggering blow to the exterminators of the various species of birds-of-paradise, crown pigeon, and many other species. Stranger things than this have happened.

Under date of November 28, a letter from the Baroness von Robberg, of Baden, Germany, conveys the following highly significant information regarding the effect of the new American law on the feather trade in Germany and in France. The Baroness writes as follows:

"The fruits of the decided victory in America are beginning to show in this country. An article in a milliner's paper—not a fashion journal, but a circular issued for the trade—informs us that the fashion for aigrettes has come to an end, due to the new American laws and the proposed English bill. These feathers are now selling in Berlin at 20 per cent. discount. The "Kolnische Zeitung"—one of the principal newspapers—publishes an article dealing with the same subject. They say the Paris fashions are being altered in accordance with the new laws, and that a prohibition in England will not throw the feather-trade-centre to the Continent, but make an end of it altogether." W. T. H.

TWO BOOKS ABOUT OUR ANIMALS.

TWO charming little books, wholly devoted to our animals, have recently appeared. Both are books of verses. "Sonny Boys' Days at the Zoo" is by Stanley C. and Ella B. Arthur. (The Century Co., 90 cents, net). It is beautifully illustrated by Mr. Arthur, and Mrs. Arthur's verses admirably fit the pictures. In many of the pictures the figure of the winsome little lad looking at the wild beasts is very appealing to all those who are yet so old-fashioned as to love little children.

"Wild Animal Verses" by Mrs. A. M. Castello (Broadway Publishing Co., $1) is a thoroughly commendable collection of very droll and often mirth-provoking poems about our beasts and birds. It is suitably illustrated. Mrs. Castello has a genuine sense of humor, and her versification is excellent. Among the best of the poems are "An Australian Suffragette," which deals with an emu and an ostrich; the "Lament of the Tasmanian Devil," "Every Doe Has Her Day," "The Chipmunk" and "What the Horned Owl Thought About It."

Making verses about wild animals is to be classed as hazardous employment. Many are called, but few are chosen; and we are glad that this attractive little volume makes good.

Because of a belief that these two volumes will be of interest to the members of the Zoological Society and to Park visitors, they will be kept for sale at the information bureau in the Lion House. W. T. H.

THE SOCIETY'S AFRICAN EXPEDITION

MR DITMARS has recently received the following graphic letter from Mr. R. L. Garner, who is now in the French Congo, searching for gorillas:

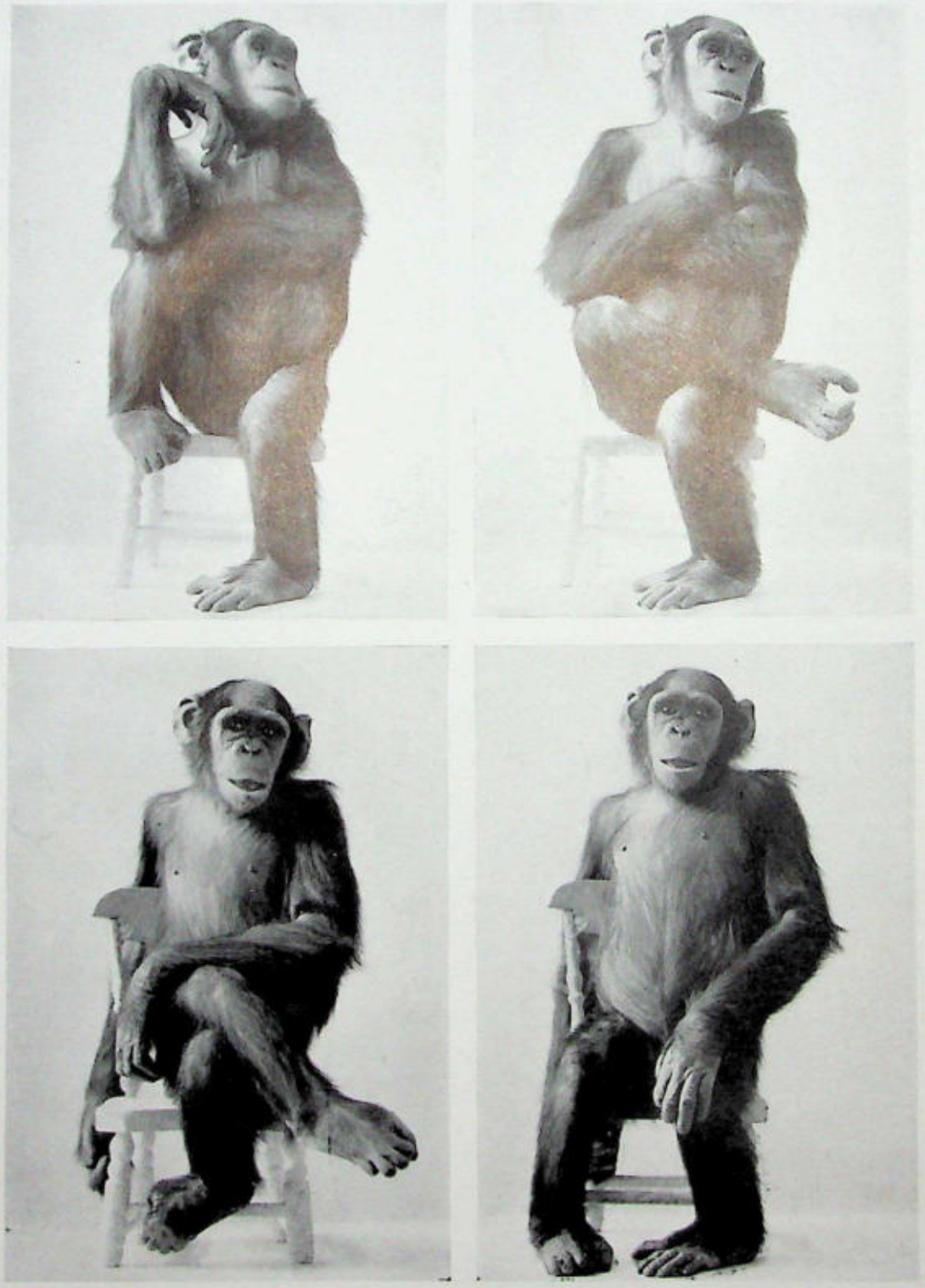
"Nomba Sanga, pres Iguela, Gabon.
"Lac Ngovi, Congo francais.

"I have word that my wire gratings are on the way. They will probably arrive by the next periodical flat-boat, which is due here—that is, in Fernan Vaz—about the 30th October—but it may be a month late.

"Yes, you have to be on the spot to know what gorilla collecting means here, but you may depend upon it, even with my leg now much mutilated, I will *get 'em*, and when I *get 'em* I'll find some way to *keep 'em*.

"I have now one of the very best specimens you ever saw. It is not the biggest, but the best—because it eats bread and bananas. Bread? Well at 20 cents a pound for flour you would call it eating bread. This little beggar eats—and destroys—about a pound a day. I have had to send to Nenglie Sika, about ninety kilometres (sixty miles) for some flour, and have just received twenty-five kilos (about forty-eight pounds) today.

"At present I have to keep my gorilla caged. I have a very comfortable affair about twenty-seven inches by four and a half feet long and



SUSIE IN FOUR POSES WHICH SHE ASSUMED HERSELF

thirty-five inches high—so the little scamp is not really cramped. I am building it a house about seven by eleven feet square and nine feet high. There we will get better acquainted. At present I can't handle it, although it recognizes me and readily distinguishes me from other natives. I allow no one else to feed it or to clean out its cage or to put in its bedding, and it knows whom it has to depend upon for such things. I keep a native boy to carry away the waste, sweep up the veranda and to search for native food for it. I am not depriving it entirely of its natural diet, and periodically I give it a good feed on the things it likes. It is very fond of *ntonos* (a species of wild ginger) and it eats the flowers, buds, stalks and leaves of this plant, with avidity. Rice? No, not even a smell of it. It also eats some sweet bananas, at least, it eats part of the rinds and a little of the fruit.

"My gorilla shows a higher degree of intelligence than I had hitherto attributed to the race, and is now becoming more amiable, but she has some ideas of her own. Every day I draw the grass bedding out of the cage in order to exchange it for clean, dry bedding for the night. Every time I begin this operation she protests. Sometimes by seizing as much of the straw as possible and packing it close in a back corner of the cage. At other times she lies down on it, face downward, spreads out both arms and both legs to cover as much space as possible. Always, in putting the fresh straw into the cage, she gets busy and helps to draw it through the bars and arranges it with much care and concern. If she sees anyone except myself touch the box or basket in which I keep her food, she at once wants to fight and sometimes makes an angry outcry. Today (Sept. 9th) I think she has eaten nearly a pound of bread, and for the first time has eaten some of the crust. She shows a decided preference for fresh bread. Today she has been in a fine mood. Several times she has beaten a tattoo on the end or floor of the cage, and twenty times or more has made that peculiar beating of the breast. I only hope that I can hand her over to you in this condition.

"Now a word, *apropos* to your remark about the temperature of 94 degrees. For some strange reason or the lack of reason you good Christians in the so-called temperate zone, imagine that it is so hot in the tropics that hens lay hard-boiled eggs. Yes, sometimes I want to send to the coast for an overcoat. Just what I have done within the last two weeks: I have slept under two blankets every night for three months, but the temperature has ranged (I imagine) along in the 50's or perhaps a bit lower. I don't think I have ever seen it 94 degrees F., here. I have no thermometer of any kind, but the Centigrade is the standard here, and I think 36 to 38 degrees is about the hottest thing we have to handle here. In fact, 33 to 35 degrees is, I think, about the run of the kiln here in February, March and April, and the other months a bit lower. But June, July and August are the cold months here, and for the last seven or eight weeks I have suffered more from cold than from heat. Of course, gauze underwear and khaki suiting are not insufferably warm clothing, but I have a two and a half yard, double width, West of England cloth (suited for overcoating) and a cotton blanket of the ordinary kind. Besides those I have double sheeting of twilled stuff and a double waterproof under me, with a waterproof cloth spread under the bed and a mosquito-bar over all. In spite of all this I have to keep myself well tucked in to avoid the cold. In January, February and March I usually sleep under a single blanket, but no night is warm enough to induce me to sleep without one at least over my loins and back.

"You must excuse my crooked writing, as I have a very badly swollen thumb, due to a splinter stuck under the nail about a quarter of an inch while hewing out by hand a piece of timber for the door of my gorilla house. The wound is very painful and necessitates a kind of whole-arm movement in writing.

"I add a paragraph, as we have just had a bit of excitement in my back yard, and I am sorry I can't send you a moving picture of the scene. I wasn't at the battle of Waterloo, but I have read some graphic accounts of it, and I imagine that it was about like the scene I have witnessed today in killing a python about 12 feet long. The snake had come within some twenty feet of the galley while eight men were at work in building a new one and caught one of my full-grown chickens. At the sound of alarm given by the other fowls my head man sprang to the fore and instantly cried out 'Mboma mpolo!'—*a big boa*. Then he and another native seized each a pole of about fifteen feet in length and the battle began. I shall not undertake to describe to you the *manoeuvres* of my black brigade, but briefly stated, they would make a comic opera sit down and look on. By the laws of physics that I was taught, called communicated force or motion, I imagine that the antipodal denizens are now feeling the



TREE KANGAROO

shock, which they will innocently report as a seismic disturbance.

"Hoping to receive a detailed letter, I am,
"Yours very truly,

September 4, 1913. "R. L. GARNER."

THE MIKADO PHEASANT.

By C. WILLIAM BEEBE.

PERHAPS the rarest bird which has been acquired by the Zoological Society during the past year is the Mikado Pheasant, a cock and two hens being now in the pheasant aviary. The cock is blue-black, with a purple fringe to the feathers of the neck, mantle and breast, each enclosing a velvety black spot. The remainder of the upper plumage is edged with steel-blue. The secondaries and many of the wing-coverts are tipped with white, while the tail feathers have white cross-bars. The female is harmoniously clothed in quiet hues of olive-brown, rufous and buff. .

Seven years ago Mr. Goodfellow, while on a collecting trip in the highlands of Formosa obtained two long black and white tail-feathers of an unknown species of pheasant which were subsequently placed in the British Museum and received the name of *Calophasis mikado*. These were obtained from the head-dress of a native hunter.

The following year the skin of an adult male was obtained, but nothing was learned of the living bird or its habits until 1912 when Mr. Goodfellow went to Mount Arizan in central Formosa and with much difficulty secured no fewer than eleven live Mikados, eight cocks and three hens.

These birds are confined to the steep slopes of this one mountain and as the birds will probably soon be exterminated every fact in regard to their life history is of interest.

These splendid pheasants do not occur below an elevation of a mile above the sea and keep to the sharp ridges which jut out from the mountain. In many places these slopes are covered with thick forest, in addition to an equally dense undergrowth of bamboo higher than a man. In such places, with the dominant trees cypress, junipers, oaks and pines, the hardy birds make their home. On some of the slopes, the steepness and rocky character permit only a growth of grass and here it is impossible for a man to descend without the aid of a rope. In early morning and evening the birds come out of the dense forest, over the ridge to feed on the slopes, and it was only by setting hundreds of snares along the summit of this ridge that it was possible to capture the pheasants alive. They were scattered and not numerous and seldom were any observed. Besides the pheasants, tree partridges, pigeons, babbling thrushes, woodcocks and a monkey were captured in the snares.

Once a cock and two hens were seen, the latter flying down the cliffs at once, and the former remaining behind clucking until a second Mikado cock was flushed. The birds could not be baited with grain and indeed their diet seemed to consist chiefly of green food and various insects. When captured it was with difficulty that they were taught to eat rice. Martens seem to be the worst enemy these pheasants have, and after the birds were in camp in cages, these blood-thirsty animals would come close to the tents, requiring constant vigilance to keep them from injuring the birds. Both sexes of the Mikado pheasant make a cheeping noise like young turkeys, and when cornered and frightened, the cock hisses like a snake. In a wild state they nest about the end of April.

The hardiness of these pheasants is evident from the fact that not a bird was lost in transit, and all reached England safely, where they were deposited in the aviaries of Mrs. Johnstone. Here in the summer of 1912 I saw them and was thrilled at the thought of their rarity as only an enthusiastic ornithologist can be. The females laid in due season, and from ten eggs sent to the London Zoo nine chicks were hatched. Of these the New York Zoological Society has been fortunate enough to secure a trio of birds in perfect health, from which it is hoped to maintain the species in this country.

These pheasants in spite of the very different coloring of the cocks, are closely related to Elliot's Pheasant. The period of incubation, however, is twenty-eight instead of twenty-four days, and the eggs are larger and the chicks darker than their ally of the mainland of Asia.

Wind Cave Bison Herd.—The herd of bison which left the Zoological Park in charge of Chief Clerk Mitchell, Mr. Rush and Mr. Dille arrived at the Wind Cave National Park on schedule time. Instead of stock cars, the American Express Company provided two steel express cars with modern equipment for running in high speed express trains. The bison were swiftly crated, placed in the cars at Fordham, New York City, and travelled the entire distance in fast express trains. Mr. Mitchell reports that all connections were closely made and the bison safely liberated on their range.



YOUNG MALE AXIS DEER, BORN IN THE PARK

ZOOLOGICAL SOCIETY BULLETIN

Departments:

Mammals — W. T. Hornaday.
Reptiles — Raymond L. Ditmars
Birds — C. William Beebe, Lee S. Crandall.
Aquarium — C. H. Townsend, Raymond C. Osburn

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Elwin R. Sanborn, Editor.

Vol. XVII. No. 1. JANUARY, 1914

ATTORNEY-GENERAL CARMODY'S ASSAULT ON THE MIGRATORY BIRD LAW

On November 8, the Attorney-General for the State of New York set up a new States Rights bogey, and under its benign influence formally and officially declared that the federal migratory bird law was "unconstitutional." Later on, he declared that his opinion would be strictly enforced throughout the State of New York.

The officers of the New York Zoological Society to whom this opinion was referred immediately challenged the legal soundness of it, and disputed its accuracy as to the enforcement of the federal law in this State. In the lengthy correspondence with Mr. Carmody that followed, and the exploitation of the subject in the press, the Society's position has been thoroughly sustained. In the beginning we assumed that the National Government, whether our Conservation Commission co-operates or not, will enforce the federal migratory bird law in the State of New York. Desiring, however, to be well grounded in that belief, we referred the matter to the Attorney-General of the United States, and requested information.

Promptly we received from the Assistant Attorney-General, Mr. Ernest Knaebel, a letter which closed with the following statement:

"It goes without saying that the Attorney-General of the State of New York cannot prevent the enforcement of a federal statute, and it is not to be assumed that he has attempted to do anything of that kind."

In view of the foregoing, and of the further fact that officers of the United States Government are now actually looking after the enforcement of the migratory bird law in the State of New York, it seems very desirable that the public should be informed that at present, and until it is set aside by the United States Supreme Court, the federal bird law is fully as constitutional as any other federal law on our statute books.

Surely no argument is necessary to convince any one save Mr. Carmody that every law is in force until it is regularly and adequately repealed, or set aside by formal process from the bench.

The Attorney-General has invited us to join him in bringing a test case, in order that he may, if possible, prove that the best bird law now in force is unconstitutional! So long as the United States Government enforces that law, we are entirely satisfied with its status. In any event, however, we hope that this State —the foremost in wild life protection—never will be disgraced by being made the plaintiff in an action against the United States to destroy the McLean law. In time a test case may be brought, but let it be by the enemies of the birds rather than by a representative of the people who did so much to bring the federal bird law into existence. W. T. H.

A SUPEROFFICIOUS OFFICIAL.

Despite the fact that the Congress of the United States has passed the McLean act for the protection of migratory birds, which seems the greatest measure yet placed upon the statute books of the country for the protection of bird life, and despite the further fact that this law has not yet been held unconstitutional by any properly qualified court, Attorney-General Carmody, of the State of New York, has taken it upon himself to exercise judicial functions for the entire country and to proclaim that the law will not be obeyed in his state.

Attorney-General Carmody, in an opinion given at the request of the New York State Conservation Commission, has characterized the act as "an unwarranted invasion by the federal government of a power that belongs under the federal Constitution to the state exclusively." In a letter addressed to Mr. Carmody, Dr. William T. Hornaday, Director of the New York Zoological Park, shows conclusively that Mr. Carmody has been superofficious in attempting to usurp the power of the courts.

Dr. Hornaday makes the very sensible point that a state officer has no right, by mere dictum, to set aside any federal statute, this province only vesting in the federal courts. Thus he says:

> "Surely it requires no legal acumen to conclude that if a State Attorney-General can, by the writing of an official opinion, set aside a federal statute, then no federal statute is safe in any state. As a layman the logic of common sense pointed out to me the conclusion that nothing less than a federal court can set aside or nullify a federal statute."

The matter of course, can only be determined by the courts. It would seem that the nation has the right, by law, to protect migratory birds which, owing to their habits, are not native of any state or section. In any event it is not a matter for the law officer of any state to determine. If the law officer of a state can, by an opinion, nullify a federal law there is no use passing national laws.—Chicago *Inter-Ocean* December 3, 1913.

OUR GIFT BISON HERD.

When Pot-Hunters were killing buffalo for their hides at $2 a head, and transcontinental trains were often delayed waiting for herds to cross the tracks, the man would have been regarded as crazy who prophesied that within fifty years buffalo born in captivity in New York City would be transported in crates to guarded preserves in the West, in an effort to prevent the race from becoming extinct. Yet that is what happened this week. And the movement of fourteen individual buffaloes is regarded by animal experts as the biggest thing that has happened in years.

The men who are trying to keep the one distinctive American animal from dying out have been encouraged in late years to note a slow but certain increase in the various herds—some in caged captivity and some in fenced ranges or preserves. The experts have been worried, however, by the probable results of continued inbreeding. They have feared the development of constitutional weakness creating a uniform liability to some special and accurate variety of pip, which might, thus, with a fair start, put an entire herd off the map, so to speak. It is to avoid this danger that fourteen of the animals in the Bronx Park Zoo are being shipped to the Wind Cave National Park, near Hot Springs, South Dakota. The shipment includes seven of each sex and the individuals run from frisky calves to morose and hairy bulls. The crates will have to be carried twelve miles from the nearest railroad station to the spot where the animals are to be let loose to find their own three-a-day in a state of nature instead of eating oats from a box or peanuts through a fence. Animals from other herds will also be liberated on this range, and it is believed that a new and vigorous strain of buffalo blood will be established after domesticity has followed the scraps of early acquaintance. Anyway, the whole thing is a pretty soft snap for fourteen buffaloes that were born in Bronx Park, and have been kept in paddocks about as big as a country estate in New Rochelle. —Cincinnati *Times-Star*, December 4, 1913.

Meetings: The Annual Meeting of the Zoological Society will be held in the Grand Ball Room of the Waldorf-Astoria—as in former years—on the evening of January 13, 1913.

The Annual Meeting of the Board of Managers will be held at the Down Town Association at 3 o'clock P. M. of January 20, 1913.

A. O. U. Meeting: On November 10, 1913, the American Ornithologists' Union gathered in New York for its thirty-first annual meeting. Morning and afternoon sessions were held at the American Museum of Natural History, luncheon being served daily by the Linnaean Society. On Friday, the members became the guests of the Zoological Society. The Aquarium was visited in the morning, the party leaving in time to reach the Zoological Park about one o'clock, where the visitors were entertained at luncheon at the Rocking Stone Restaurant. The remainder of the afternoon was devoted to the inspection of the collections, the birds forming the center of attraction.

Recent Arrivals: Nubian giraffe; great anteater; two snow leopards; white-handed gibbon; two yaks; tree kangaroo; hartebeest; Diana monkey; two squirrel monkeys; green monkey; vervet monkey; spider monkey; coyote fox; gray fox; two mink fox; sharp-nosed opossum; prehensile-tailed porcupine; six golden agoutis, a number of small rodents and a collection of seventy-five reptiles; many of them rare and interesting.

NEW MEMBERS.

JUNE 24, 1913, TO JANUARY 1, 1914.

LIFE MEMBERS.

Blodgett, Wm. Tildon,
deHeredia, C.,
Harriman, Mrs. E. H.
McKinney, Glenn Ford,
Maxwell, Robert,
Niles, Mrs. Florence B.,
Painter, Kenyon V.,
Pierce, Henry Clay.
Winthrop, Egerton, L.

CORRESPONDING MEMBERS.

Millward, Russell Hastings

ANNUAL MEMBERS.

Adams, John Dunbar,
Adler, Dr. I.,
Baker, Charles D.,
Baker, Charles H.,
Bell, Louis V.,
Bernard, Pierre Arnold,
Boese, Quincy Ward,
Bradbury, Harry B.,
Brady, James Buchanan,
Butler, Charles Stewart,
Chamberlin, William B.,
Chisholm, Mrs. H. J., Sr.,
Christiancy, George A. C.,
Church, Louis P.,
Clark, Herbert L.,
Cochran, G. D.,
Converse, Miss Mary E.,
Curie, Charles,
Dodge, Francis P.,
Donaldson, Robert M.,
Dow, Charles M.,
Fairchild, Benjamin L.,
Farrell, James C.,
Goldmann, Nathan,
Goddard, Morrill,
Graf, William,
Hackett, James K.,
Holzmaister, Louis V.,
Hoyt, Miss Virginia Scott
James, Henry, Jr.,
Jenkins, A. W.,
Keyes, Mrs. Charles W.,
Lea, Charles M.,
Mather, Samuel,
Moore, Mrs. Russell W.,
Nickerson, Hoffman,
Niles, Miss Florilla,
Norrie, Miss Mary,
Piatti, Dr. Virgil C.,
Porter, Alexander J.,
Potts, Jesse W.,
Roosevelt, Mrs. J. West,
Ruhe, Louis
Shipman, Richard D.,
Squire, Eben H. P.,
Steinbrugge, Edw., Jr.,
Suffern, Robert Adams,
vonDreele, W. H.,
Wessel, Henry.



THE MARSH GARDEN
View from the north end, looking toward the Elephant House.

ITEMS OF INTEREST.

Batrachians: Another Reptile House exhibit rapidly increasing in size is the series of Batrachians. We have of late given much more attention to the frogs, toads and salamanders, and a considerable number of new cages and small tanks have been installed. We note that our visitors are particularly interested in these small creatures when attractively labelled, although the labelling proposition with these diminutive cases and tanks has been rather a puzzle. Among the additions to this collection is the interesting mountain toad which appears to represent a giant race of our common toad, that inhabits elevated regions in the Eastern states. A careful examination, however, fails to demonstrate any characters of sub-specific value. Another recent addition is the big California toad, the striped frog, *Rana virgatipes*, and many species of the American salamanders, both aquatic and terrestrial. We have received terrestrial forms of the axolotl so that our exhibition of these interesting specimens now shows both phases. Among the examples of the aquatic axolotls are both the black and albino forms. The Old World batrachians are now quite elaborately represented. Among them are: The Japanese giant salamander, the blind salamander, or proteus from the Adelsburg Cave in Austria; the European salamander, the ribbed newt, the marbled newt, Australian newt and the brilliantly marked fire newt of Japan. There is also a good series of European frogs and toads. While adding to the series of batrachians we are now preparing large shallow tanks for the better exhibition of the more strictly aquatic frogs of both Europe and America.

Big Horn: The larger of the two big-horned sheep has been transferred from the Zebra House where it was temporarily quartered to the northerly enclosure of Mountain Sheep Hill. This powerful animal seems to be in superb condition, despite the general assertion that we would have difficulty in maintaining the species as a captive. Thus far these two animals have been in splendid health, although we were at first worried about the probability of their becoming acclimated.

Great Anteater: For the first time in about five years we are able to exhibit a splendid specimen of the great anteater. This is an exceptionally vigorous example and has been quartered in one of the larger cages of the Primate House, as the uniform temperature of that building is well suited to the animal's requirements. It has been provided with a section of soft log and amuses itself the greater part of the day in tearing at the wood with the powerful claws of its forefeet. Happily, this is an active specimen and our visitors have ample opportunity in observing him parading about the cage.

Mouse Deer: It is our belief that we have broken records in maintaining in good health the mouse deer, or *Chevrotain*, which is a notoriously delicate animal, seldom surviving captivity more than a few months. Our specimen has been on exhibition considerably over a year's time. The only trouble we have had with this animal has been with its feet, which were apparently very soft and tender and rapidly developed bad sores on a wooden or cement floor. Our specimen is quartered in the Primate House, at a uniform temperature of about 70 degrees and to protect its feet, the floor has been entirely covered with a soft blanket. Since the floor was thus treated the feet have healed and the animal now appears to be in perfect condition.

The Walrus: The Atlantic walrus presented to the Park by Mr. Paul J. Rainey has been exhibited in the Park for four years. When this animal arrived here it weighed 149 pounds; its weight at present is 406 pounds. The tremendous appetite of this vigorous creature is worthy of note. Compared with its weight, the food it consumes is quite out of proportion with other animals. The walrus consumes about forty pounds of clams and fish each day, while a cat animal of the weight of this walrus would consume ten to twelve pounds of meat the day. However, the members of the *Pinnipedia* are veracious feeders and immediately show signs of emaciation, unless their appetites are fully satisfied. The walrus is provided with salt water, which is kept at about ocean density by the addition of sea salt and frequent tests with the salinometer. We are rendering the tank of the California sea lion slightly saline as we have noted that in fresh water this animal shows a tendency to develop bad sores.

Large Rattlesnakes: One of the most dangerous consignments to arrive here consisted of a crate of nine diamond-back rattlesnakes. These creatures were captured in one spot not far from Orlando, Florida, as they were preparing to retire into their dens for the winter. The big rattlesnakes of Florida hibernate a short time during the cooler months, and, like the smaller species of the north, congregate in considerable numbers at such periods. The col-



Crating the last Bison, Zoological Park, November, 1913.



The Bison leaving the Zoological Park, November, 1913.

BISON FOR THE WIND CAVE NATIONAL PARK, SOUTH DAKOTA

lector who captured these rattlesnakes informs us that his troubles were many in transporting a large bag containing these heavy reptiles to a wagon, some six miles distant. Placed in a cage of the Reptile House, the big snakes rattled almost incessantly for several days, and the sinister buzz attracted many visitors to their cage. Several of these snakes are over six feet long and have a head as broad as the top of a man's hand.

New Arrivals: A valuable consignment of animals has arrived from Carl Hagenbeck at Hamburg. This consisted of a male Nubian giraffe, eleven feet, seven and a quarter inches in height, a pair of yaks, one Lelwel hartebeest, two snow leopards and one tree kangaroo. All of these animals are in splendid condition. The yaks, hartebeest and tree kangaroo represent species new to the collection.

Animals in School: The New York Zoological Society has recently donated a series of mammals and birds to the Washington Irving High School. In this magnificent school building, one of the largest in New York, a room has been provided with large and attractive cages for the exhibition of a representative series of mammals, birds, reptiles and fish. Classes are admitted at various times of the day, and it has been explained that some of the children visiting this zoological collection have for the first time seen wild animals of any kind. Miss Lillian Sage is in charge of the collection and explains that in this room the children will receive the elementary instruction which will fit them for later and more serious study at the American Museum of Natural History and the Zoological Park.

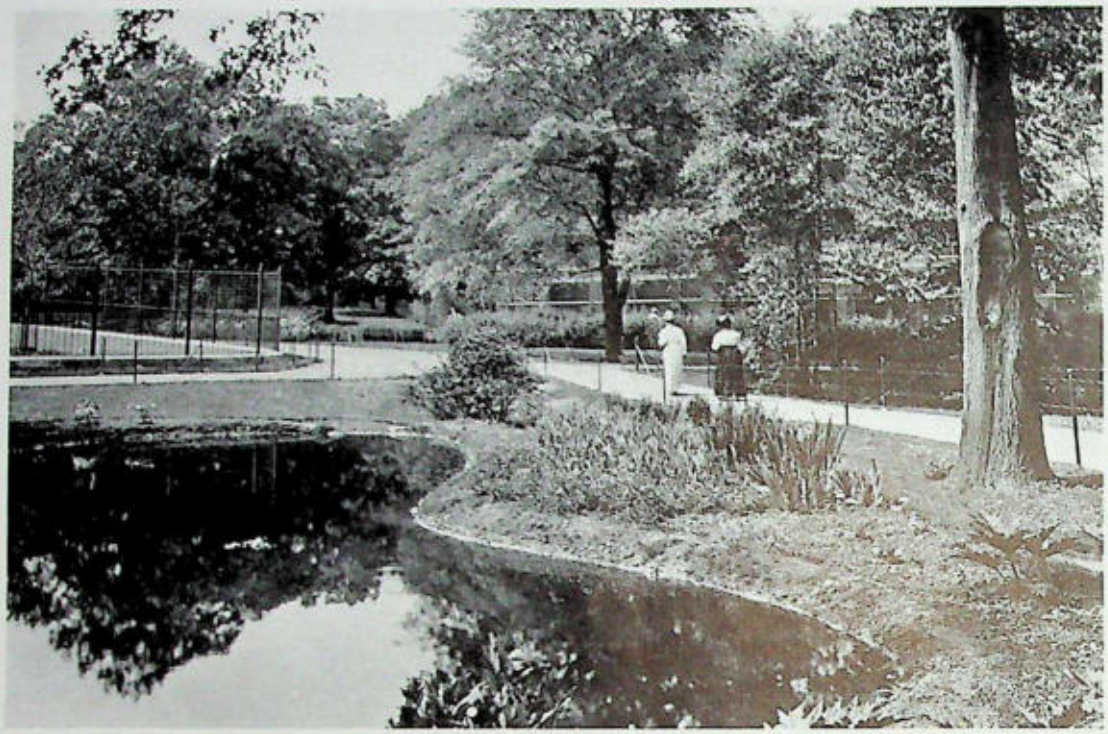
Hibernating Rodents: The erratic tendencies of the dormice and spermophiles to hibernate have puzzled the keepers of the Small Mammal House. On one occasion six dormice were reported dead and the specimens brought





THE WIND CAVE NATIONAL PARK, SOUTH DAKOTA

Bison from the Zoological Park on their range, Wind Cave National Park



THE MARSH GARDEN
View taken from the east bank, looking toward the Eagle and Vulture Aviary.

to Mr. Ditmars' office in an agate pan, afterwards to be tagged and sent to the ice box. Left in the warm office for a half hour, the men concerned were surprised to find these dormice actively running about the place. The temperature does not seem to play so important a part with the dormant tendencies of these animals, since there are times when they are as lively as their tropical allies in nearby cages. Within an hour several of them may be lying apparently lifeless in corners of the cage and remain in this condition for a day or so. These hibernating traits are very deceptive; the animal showing no signs of life when handled. The eyes remain closed and there is no external indication of breathing. The keepers are now very wary about reporting such examples as "dead."

Wild Home Builders: Judging from the activity of the prairie dogs, and the squirrels that are free in the Park, we are led to imagine that an old fashioned winter is being inaugurated. The gray squirrels that are running in generous number about the Park are storing their nests with leaves, shed feathers from the birds and soft bark from such trees as the cedar. Several ornamental benches made of cedar boughs have been stript clear of shaggy bark by the industrious creatures within the past ten days.

The Anthropoids: The series of Anthropoid apes, composed of five orang-utans, four chimpanzees and one gibbon demand more elaborate care as these animals grow older. Most of these creatures have passed from the state of infancy and some of them have become dangerous. The chimpanzee Baldy is now quite matured and so savage at times that it is difficult to enter his cage. Quite recently he was barely prevented from injuring one of the keepers with a pitch-fork, which he wrested from the man's hand. The two larger orangs are even stronger than this chimpanzee, but are less savage. At times they are very stubborn and one of them would be more than a match for a powerful man. The larger of the orangs has a spread of arms of seven feet and weighs 120 pounds.

The Tree Kangaroo: A vigorous example of the black tree kangaroo, *Dendrolagus ursinus*, is the first specimen of arboreal kangaroos exhibited in the Park. This animal is slightly larger than the common wallabies which are at all times on exhibition. Its pelage is quite dense, imparting a decidedly stout appearance.



THE OUTLET OF THE MARSH GARDEN
The broad leaved plants transform a commonplace stream into one of beauty.

Tree kangaroos are recognized by the general proportions of the two pairs of limbs—the length of the front pair being but slightly less than that of the hind limbs. The tail is very long and thickly furred. Four species are recognized; all members of the genus *Dendrolagus*. Little is known of any of the species in the native haunts, although it appears they spend most of their time in the trees. The home of these creatures is in the dense tropical forests of New Guinea and the north of Queensland.

Rodent Collection: The collection of small rodents which was formed in the Reptile House with the view of displaying the injurious species of these creatures together with their natural enemies, has quite outgrown its quarters. Over a dozen new cages were recently added. This is now a valuable series and represents about forty species. A rare species of mouse was recently added—the Egyptian desert mouse, *Meriones crassus*, of Egypt and Arabia. Another of the new desert species is the gila chipmunk, *Tamias dorsalis*. The Arizona wood rat, *Neotoma pinetorum*, is another new arrival. One of the most interesting examples in this series is the big pack rat, from Nevada, which animal is feverishly engaged the greater part of the day in building an elaborate nest, then changing its mind and transporting the entire nest to another corner of the cage, and vice versa.

R. L. D.

The Mocking Bird: In the winter of 1911-12, a mocking bird remained for several months about the southern boundary of the Botanical Gardens, near Fordham Road. This year either the same bird or another of the same species has taken up its home near the entrance on the Southern Boulevard. On November 27, it was observed feeding on berbridge (*Berberis Thumbergi*); two days later it was eating catbrier (*Virburnum prunifolia*) and on the 2nd and 3rd of December its diet had changed to nanny berries (*Smilax rotundi*).

SAMUEL STACY.

The Marsh Garden: During the transformation of Bird Valley it was decided to form a water and marsh-garden, on the east side of the walks in front of the Zebra House.

Luckily the first requisite for such a garden, water, was at hand, in the copious drainage of the Elk Pond. A good clay subsoil and sufficient material for grading purposes, made it easy to use this water in forming the series of pools which are now the nucleus of this garden. It is already one of the beauty spots of the Park, though the shrubs and various perennials were planted only this spring, and then had to struggle against many foes. Mallard ducks, Canada geese, and other voracious water-fowl, soon discovered that the ponds contained lotus and water-lily shoots, and other tender provender that suited their palates better than that provided by the regular commissary department.

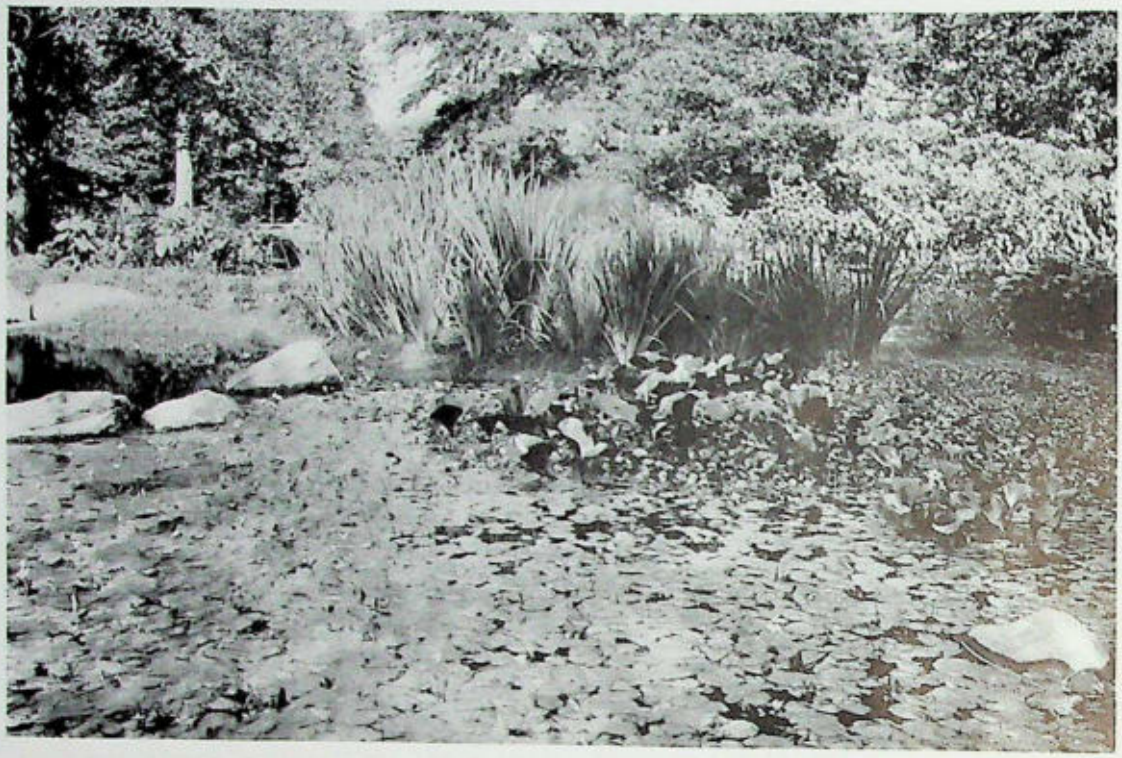
One of the most delightful of all gardens is the water-garden. Water and marsh plants begin to bloom early in the season, and when the selection of plants has been carefully made, they will continue to flower until frost, and yield a great diversity of color and forms. They remain fresh, and luxuriously green during the hot, dry spells of summer when everything is sere and yellow,—that is, of course, if the supply of water does not give out.

Whenever one thinks of water-gardens, the thought is associated with the water-lily at the same time,—gorgeous white, pink, red, yellow and blue flowers from many climates. But undoubtedly the real charm of the water-garden lies in the shore or marsh plants, and their reflections mirrored clearly on a calm day, or in the distorted ripples that the water colorists love to paint, when the surface of the pool is disturbed by the wind. Even in winter, when the snow lies on the ground and the marsh-garden is covered with a blanket of ice, the leaves of the long stemmed reeds and rush-like plants wave and flutter gracefully over the pool, as though conjuring spring to come and open the door of ice to the green plants below.

In the selection of plants for our marsh-garden, our old rule to give indigenous plants the preference, has been observed to a great extent. Iron weed, boneset, pokeberry, cardinal flowers, marshmallows, and many other shore plants, fronted by arrowhead, wild rice and lizard tail, the most sweet scented of them all, fill the space close to the shore; while far in the rear, both to lend height and dignity, and to screen the Service Road, are many of our best American shrubs, such as silky- and red-twigged cornee, sweet pepperbush, coral-berry, arrowhead and buttonhole bush.

It was hoped that we could establish a colony of lotus in one of the smaller pools, but the ducks and geese decreed otherwise. They destroyed in one night, the whole planting. Other plants have been devoured several times, but we have managed to establish permanently most of them, and by careful guarding and perseverance, we hope to have most of the worth-while water plants in abundant quantities in another year.

H. W. M.



THE MARSH GARDEN
Water-lilies and border line of marsh plants.

THE WILD CANARY.

WHEN one considers the obscurity which beclouds the origin of many of our domestic creatures, it is a great satisfaction to know that the ancestry of one, at least, is well established. The plain little wild canary continues to exist abundantly in the isolated groups of eastern Atlantic Islands, as the Canaries, the Azores and Madeira, while its domestic descendants, disguised in a great variety of form and color, brighten the homes of men in the four quarters of the earth. Five specimens of this species have just been brought to the Zoological Park by a collector who secured them at Las Palmas, on Gran Canaria. They are still in the sober brownish garb of the young bird, but will later assume a brighter plumage, in which the upper parts are ashy brown, with the cheeks, crown and abdomen greenish yellow.

Early in the sixteenth century, canaries were first brought to Europe. They at once became popular as cage birds, and the Germans soon began the improvement of the song by selective breeding, an art in which they continue unrivalled at the present day. The breeding of canaries was soon taken up in other countries and it was not long before certain definite varieties appeared. From then on, the history of the canary parallels that of most other domestic creatures, skillful breeders fixing and accentuating slight variations, until we have the great variety of canaries of modern times. The English and Scotch devoted their energies to the fixation of certain types of form and color, rather than to quality of song, and have produced among others the breeds known as the Yorkshire, the Norwich, the Border Fancy and the Scotch Fancy.

Not least interesting among the color varieties is the cinnamon. As is well known, many species of European birds occasionally produce albinistic, pink-eyed individuals of a pale brownish color, and the wild canary is no exception. These cinnamon birds seem to have a marked propensity for variation and may have had much to do with the production of other color varieties.

In this connection, Mr. John Robson, an English authority, has formulated an interest-

ing theory. On examining a series of over fifty skins of various wild British birds and captivity-bred hybrids in the cinnamon plumage phase, he found these, without exception, to be females. Experimentation with cinnamon canaries proved this character to be a sex-limited recessive, and it was found that a cinnamon female will never produce young of this color, unless mated with a bird of cinnamon parentage. As wild males of this color seem never to occur, it is evident that such a race would be very unlikely to increase.

Among the wild canaries, therefore, there was little likelihood that the color would gain headway, because all of the young of a chance cinnamon female would revert to the normal color of the species, unless, as is very unlikely, she happened to mate with a bird the mother of which was a cinnamon. The green offspring of the union of cinnamon and green would be expected to produce young of each color, in the Mendelian proportion of three greens to one cinnamon, but the chance that brother and sister would be brought together at the beginning of the next breeding season is remote.

As soon as the cinnamon sports appeared among captive birds, however, the race was fixed. This was accomplished by mating the male offspring of cinnamon females to others of this color, when cinnamon males at once appeared. L. S. C.

DESTRUCTION OF POLAR BEARS.

By Lorenz Hagenbeck.

THE annual catch of polar bears is decreasing every year, because these animals are now being hunted about twice or three times as much as they were thirty or forty years ago. From Tromsoe, alone, sixty-one vessels outfitted for Spitzbergen and East Greenland in 1913; and besides other things they have brought back seven live polar bears, 125 dead ones and 200 reindeer. Counting the vessels leaving from Hammerfest, Wadsoe and a few less important towns also, about 100 vessels left Europe in 1913 for the purpose of the capture of northern animals. Many of these vessels are provided now with motor-boats, so as to be able to penetrate further into the ice.

In former years there were two to three large tourist's vessels leaving the port of Tromsoe for the purpose of hunting polar bears. Usually they were hired by rich Englishmen, Germans or Austrians, and brought back from forty to sixty polar bears shot within five or six weeks' time.

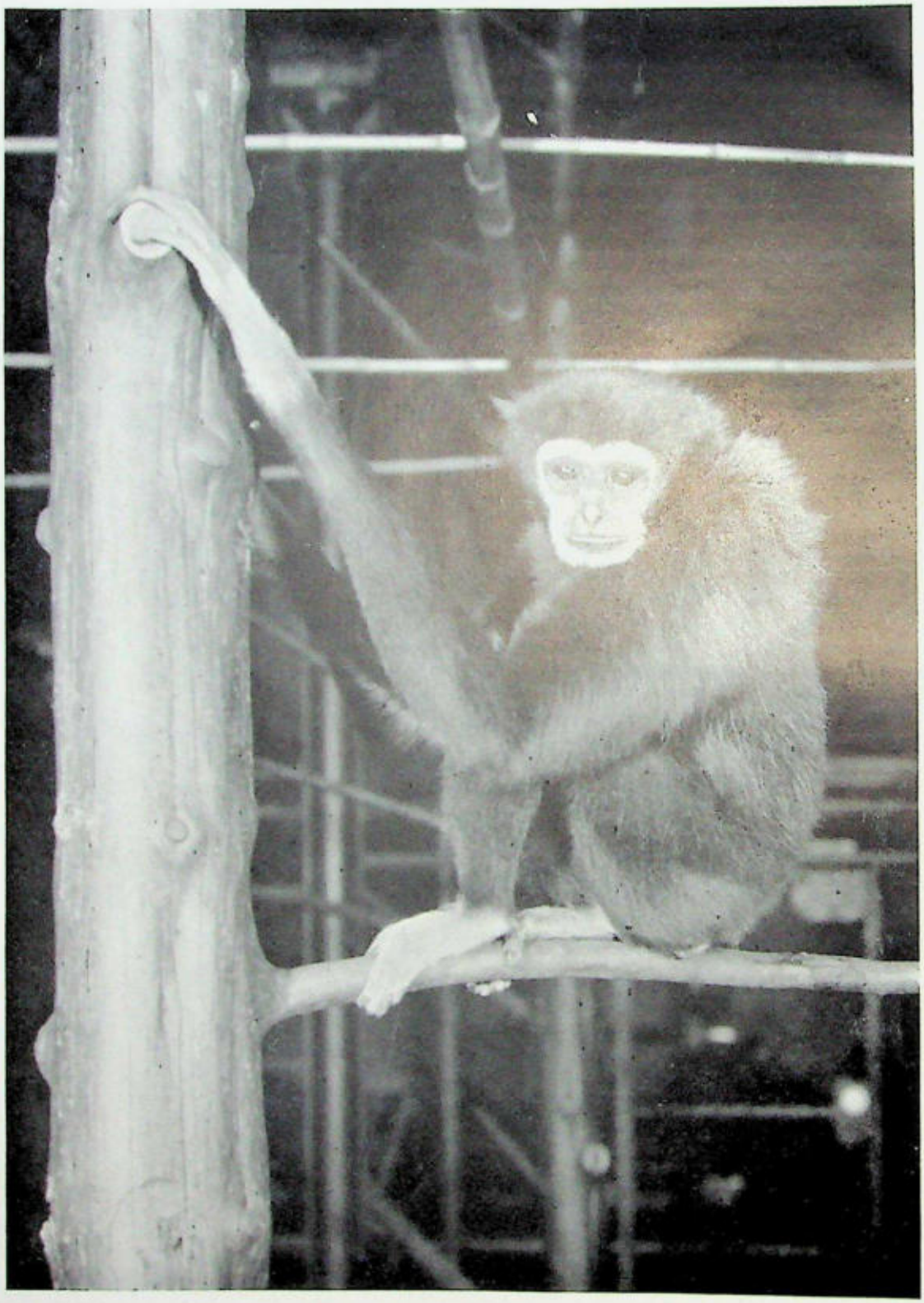
During the last few years the capture of polar bears near the east coast of Greenland has so greatly decreased that in 1913 only one vessel with tourists was sent there. The other vessels are lying idle, and it is not worth while to equip them.

Since 1890 a number of bear hunters from Tromsoe and Hammerfest have established hunting stations for the winter months on the Spitzbergen Islands. They consist of wooden houses, located at a distance of 100 or 200 kilometers from each other, and there are either two or three men at each station. These men set traps, and also lay out poisoned meat or seal's bacon. One must reckon, however, that fully one-half of the animals killed through poison in this way are lost, as the polar bear has the habit of drawing near the water if it feels sick. Thus it happens that the sick animals are drowned or frozen fast in the broken ice. One company has thus been able to kill and secure ninety polar bears during one year.

As a check on this deadly commercial pursuit, during the past three years the Norwegian Government has prohibited the killing of polar bears by poison on the Spitzbergen Islands. Unfortunately, however, as the land belongs to nobody, the hunters generally do not care for this, for there is no police authority on the spot to control them.

During the last three years there have been comparatively few skins of polar bears at Tromsoe and Hammerfest, although those cities are the principal markets for them. As it is known with certainty that the polar bear wanders, it may be possible that it again exists at the old capture places, so that a larger number may be caught again, but it is very doubtful. One thing is sure, however, and that is that the polar bear is far less numerous now on the east-coast of Greenland and Spitzbergen than was the case between 1860 and 1880.

Electric Trail.—The electric cable stretching across the space, fronting the Service Building, is now a regular road-way for two squirrels that have a nest in a big oak upon which the cable hangs. Every night between four and five the little animals skip gaily across this perilous tight wire to their nest. Mr. Merkel was greatly puzzled when he saw a squirrel pass the window, apparently walking in space until he moved in a position where the cable could be seen.



WHITE-HANDED GIBBON
A rare anthropoid recently added to the collections of the Park.

ZOOLOGICAL SOCIETY BULLETIN

AQUARIUM NUMBER

Prepared by C. H. Townsend, Director, and R. C. Osburn, Assistant Director.

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A HAUL OF THE PORPOISE SEINE
Cape Hatteras November 12, 1913.

ZOOLOGICAL SOCIETY BULLETIN

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AT LAST—A SCHOOL OF PORPOISES.

By C. H. TOWNSEND.

AFTER several discouraging attempts with animals more or less injured, the Aquarium has, not merely a single healthy porpoise, but a school of them. They were received without injuries of any kind, and have already lived in the building much longer than any single injured specimen hitherto received. After three and a half months in a pool thirty-seven feet in diameter and seven feet deep, they continue to be in apparently the best of condition, feeding, leaping, and otherwise disporting themselves after the manner of porpoises on the high seas.

No more popular exhibition of marine life has ever been made in the Aquarium. To have these lively rangers of the open ocean dwelling in our midst is fascinating, and every citizen who has failed to pay them a visit should do so at once, for, although present prospects are good, there is no certainty about the future with wild animals in captivity.

Two previous attempts were made to bring porpoises from Cape Hatteras. Although arrangements for their shipment were perfected, the instructions given were not carried out by those to whom the shipments were entrusted. In the first instance all the animals died before they could reach New York, as they were unfortunately shipped dry and could not survive the journey without the cooling and supporting medium of water. The next attempt, made last June, when the same blunder was made, gave only slightly better results. Four of the six porpoises shipped died between Hatteras and Norfolk, Virginia. At the latter point the shipment was met by the Director of the Aquarium, who promptly filled the tank containing the two survivors with water. One of the animals died soon after reaching New York, but the other lived two and a half months, notwithstanding the fact that the heating it had undergone during the first stage of shipment produced numerous festering sores, which eventually ended its career.

Firmly believing that plenty of cool water would insure safety during transportation, the Director of the Aquarium went to Hatteras November seventh, to make sure of the details of shipment which, entrusted to others, had been neglected. As far as the adult animals are concerned, the results have been satisfactory. There are five adults about eight feet long still living, but the four half-grown porpoises died soon after their arrival in New York. The adults gave no trouble during shipment, while the young were exceedingly restless and continually bruised themselves by their struggles in the shipping tanks.

Porpoises are warm blooded, blubber-covered mammals and give off so much heat that the water of the shipping tanks becomes actually warm, requiring to be replaced by cold water every five or six hours. Immediately after their capture at Hatteras, where they were dragged on the beach with a seine about a thousand feet long, the porpoises were placed for twenty-four hours in a salt water pond just back of the ocean beach. No chances whatever were taken in the matter of temperature. On the beach their natural heating would no doubt have been accelerated by the hot sunshine. The following day they were seined out of the pond and placed in the shipping tanks, which were then hoisted on board a schooner



THE PORPOISES ARE COMING

and filled with water. During the voyage up Pamlico Sound and even through the Great Dismal Swamp Canal the fresh water in the tanks was changed whenever it became warm. After reaching the New York steamer at Norfolk the cooling of the porpoise tanks en route was greatly simplified by the use of the salt water hose.

The shipping of porpoises alive is therefore a simple matter. Adult animals readily stand transportation, while the young animals do not. If carried in long, narrow boxes just sufficiently large to accommodate them without rubbing, and if kept supplied with sufficient cold water to support and cover them, they can be handled easily enough. There is probably no reason why a porpoise, under such conditions, should not be carried in a tank many times the distance from Hatteras to New York.

Our porpoises are rather expensive boarders, consuming between eighty and ninety pounds of fresh herring or tomcod a day. For a few days after their arrival they would eat nothing. Within a week they began to take a few live fishes and, after having once started to feed, it was not difficult to get them to take dead fish. A few days of hunger brought them around, as it does in the case of the newly captured seal or sea lion.

Cape Hatteras, singularly enough, is the only point in North America where a porpoise fishery has ever been regularly conducted. The bottle-nosed porpoise appears to winter off our South Atlantic coast and is quite common in the vicinity of Cape Hatteras during the fall, winter and spring months. Schools of porpoises may be seen passing every day just outside the surf. They are taken with a net about one thousand feet long, which is placed a couple of hundred yards outside the line of surf and parallel with it. At each end there is a boat in waiting, ready to carry the haul lines directly ashore as soon as a band of porpoises has passed between the net and the surf. After the lines have been carried ashore, the porpoises are considered fairly secure, for they do not often attempt to cross the lines and, even when they do, can usually be frightened back by having someone shake and jerk each line continuously. It requires some time to bring the ends of the big seine to the beach.



DRAGGING A PORPOISE FROM THE NET



A DECK LOAD OF PORPOISE TANKS: DISMAL SWAMP CANAL.

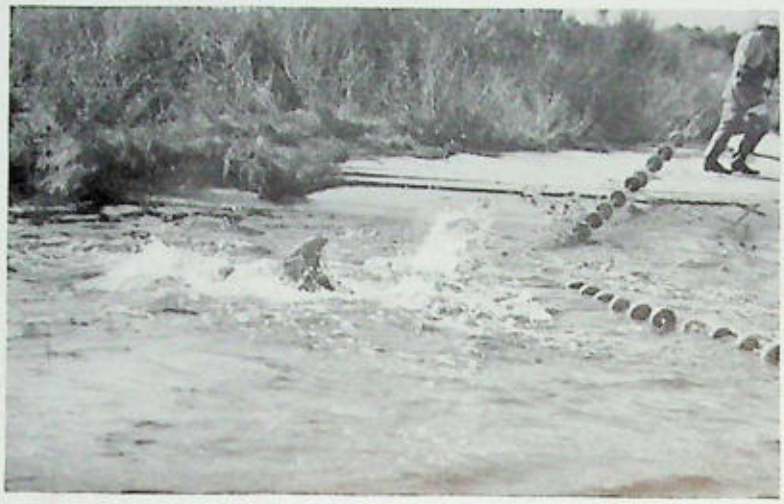
but even then some of the porpoises may get away by leaping over the net or attempting to dive under it. The former can be prevented to some extent by sending a boat to the outer curve of the net, which serves to keep the porpoises from crowding against it. Some of those that attempt to dive underneath become enmeshed and, being air breathers, are soon drowned.

Thirty-three porpoises were beached in the haul of the seine which provided our specimens. Although porpoises have been taken at Cape Hatteras from time immemorial, the fishery has been conducted in a merely desultory manner, with but little capital invested. The greatest number taken in a single year appears to have been about one thousand. Porpoises are valuable for their jaw oil, body blubber and hides, the value of each being in the order given. The oil derived from the jaws represents the greater part of the value, being worth ordinarily twenty-five dollars a gallon. This oil is extracted from the broad posterior branches of the lower jaw. It is practically the only oil used for the lubrication of watches and similarly delicate mechanisms.

The bottle-nosed porpoise (*Tursiops tursio*), is the only species of porpoise that has ever been taken at the Hatteras fishery. Our eight-foot specimens represent the average size. A number of specimens were measured in November, however, which exceeded nine feet in length. The greatest length for this species at Cape Hatteras is twelve feet, but this is altogether unusual. The specimens were presented on the beach at Hatteras by Mr. Joseph K. Nye, of New Bedford, Massachusetts, the proprietor of the fishery. They were transferred to New York at the expense of the New York Zoological Society.

The porpoise exhibit in the New York Aquarium is absolutely unique. No other aquarium in America or Europe is fitted with pools large enough to accommodate porpoises, and it is doubtful if there are at the present time any other specimens in captivity.

Our bottle-nosed porpoise (*Tursiops tursio*) closely resembles *Delphinus delphis*, a species of porpoise or dolphin more abundant in the eastern Atlantic and in the Mediterranean than along our coast. The latter is the dolphin known to the ancients, and which, for unknown reasons, has been systematically caricatured by painters and sculptors since the very beginnings of art. Sculptors now have an opportunity to visit the Aquarium and see what the real dolphin looks like.



RECAPTURING THE PORPOISES IN THE SALT-WATER POND

In the matter of name there is some latitude. All porpoises and dolphins belong to that family of the order of whales called *Delphinidae*, or dolphins, of which there are at least fifty different species, and the names porpoise and dolphin are to some extent interchangeable.

The former is, however, usually applied to the short-jawed kinds. The name "bottle-nose" is inapt in the case of such animals, as the nose or nostrils of all dolphins and porpoises is on top of the head.

The name dolphin is also applied to a fish (*Coryphaena*), celebrated for its changing colors.

THE SCALE AS AN INDEX TO THE AGE OF A FISH, AND THE AGE OF THE PACIFIC SALMON.

A MEANS of determining definitely the age of a fish at any time has long been sought by ichthyologists and fish culturists. This is of importance in finding out the ages at which fishes reach sexual maturity, as well as the length of life of the various species. In the case of the Pacific salmons of the genus *Oncorhynchus* the problem has a special significance, since in all cases these fishes die after spawning,* and much discussion has been waged over the question of the age at which these fishes return to the fresh waters to breed.

It has been discovered that the scales bear marks which indicate not only the length of life, but also the relative rate of growth in different years. This has been thoroughly tested on the Atlantic salmon in Scotland, and has been shown to apply also in the case of the trout and to other fishes as widely separated as the carp, eel, bass, cod and flounder.

The eminent ichthyologist, Professor Chas. H. Gilbert of Stanford University, has recently published the results of studies on the Pacific coast salmons** in a paper from which the substance of the present article is drawn. While the general character of the scale and its markings are well enough known to the ichthyologist, it may be well here to quote from Professor Gilbert: "The scale in general persists throughout life and grows in proportion with the rest of the fish, principally by additions around its border. At intervals there is produced at the growing edge a delicate ridge upon the surface of the scale, the successive ridges thus formed being concentric. . . . each representing the outline of the scale at a certain period in its development. Many of these ridges are formed in the course of a year's growth, the number varying so widely in different individuals and during successive years in the history of the same individual that number alone cannot be depended on to determine age. For this purpose we rely upon the fact that the fish grows at widely different rates during different seasons of the year, spring-summer being a period of rapid growth and fall-winter a season when growth is retarded or almost wholly arrested. During the period of rapid growth the ridges are widely separated, while during the slow growth of fall and winter the ridges are crowded closely together, forming a dense band. Thus it comes that the surface of the scale is mapped out in a definite succession of areas, a band of widely spaced rings always followed by a band of closely crowded rings, the two together constituting a single year's growth." (See the accompanying figure.)

The matter is not quite as simple as it might appear, however, for, as Professor Gilbert

*A possible exception occurs in the case of certain young male chinook salmon, which mature precociously at 3 to 7 in. long, without having gone to sea. The fate of these is not yet known.

**Age at maturity of the Pacific Coast Salmon of the Genus Oncorhynchus.—Bull. U. S. Bureau of Fisheries, Document No. 767, March 20, 1913.



DOG SALMON SCALE
Mature Male 31¼ inches long, fourth year.
(Copied from U. S. Bureau Fisheries *Bulletin.*)

points out, irregularities occur, due to other causes than purely seasonal ones, and considerable experience is necessary for the correct interpretation of many cases, while a small number of doubtful scales have been found. These latter are too few, however, to affect the general results, and further study may entirely eliminate them.

The five species of Pacific salmon: Sockeye or Red Salmon (*Oncorhynchus nerka*), King or Chinook Salmon (*O. Tschawytscha*), Silver or Coho Salmon (*O. kisutch*), Dog Salmon (*O. keta*) and Humpback Salmon (*O. gorbuscha*), were all investigated.

Reference to the following summary of results will show interesting differences in the spawning age and habits and the time of the seaward migration of the young of the various species of this genus. The humpback, for example, is much less plastic than other species, spawning always at a definite age and running to sea as soon as hatched, while the chinook females may spawn in the fourth to the seventh year and go seaward either as fry or yearlings, while a few males develop precociously and never enter the salt water. As they all die after spawning, the same differences in length of life naturally obtain.

Summary of Gilbert's Results.

The sockeye spawns normally either in the fourth or fifth year, the females being preponderatingly four-year-old fish. The young migrate seaward shortly after hatching or may remain in fresh water until the second spring.

Chinook salmon spawn normally in the fourth, fifth, sixth or seventh year, but four-year-old females preponderate. The young migrate soon after hatching or remain in fresh water till the second spring.

Silver salmon spawn normally only in the third year. The young migrate either as fry or yearlings, but adults are developed almost exclusively from the latter.

Dog salmon mature normally in the third, fourth or fifth year and pass to sea as soon as they are able to swim.

Humpback salmon mature always in their second year and migrate to the sea as soon as they are free swimming.

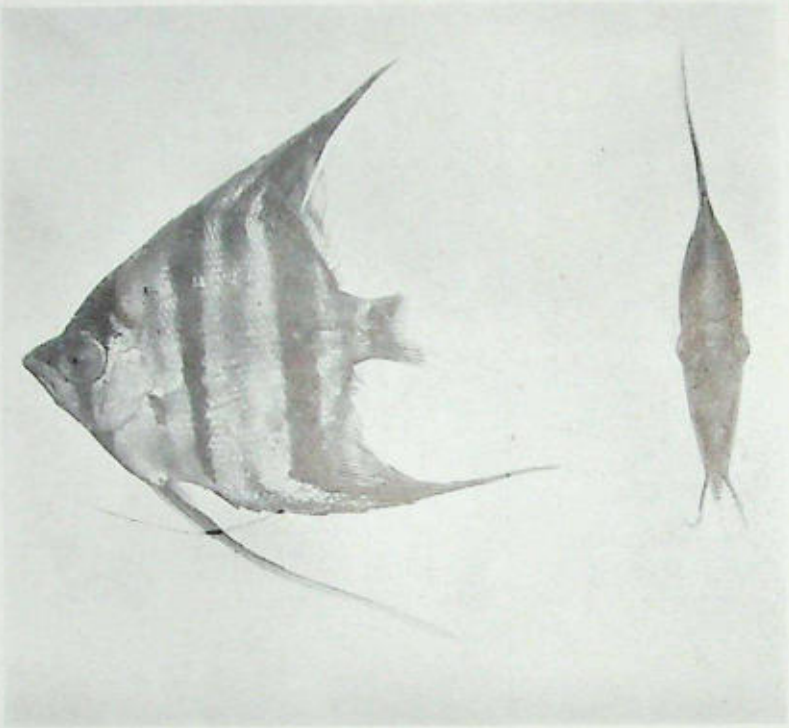
Pacific salmon "grilse" are precociously developed and conspicuously undersized fish which sparingly accompany the spawning run. So far as known they are male only in the chinook, silver and dog salmons, and usually so in the sockeye, except in the Columbia River, where the two sexes are about equally represented. Grilse of the silver and dog salmon are in the second year, of the chinook in the second and third, and in the sockeye in the third year.

The great differences in size of the individuals in a run are closely connected with age, the younger fish always averaging smaller than those a year older, though the size curves overlap somewhat. R. C. O.

THE HALF-MOON FISH.

LOCAL fish fanciers have in the past few months been greatly interested not to say excited, over the introduction of a strikingly handsome little fish suitable for small aquaria. This is the half-moon fish (*Pterophyllum scalare*, Cuvier & Valenciennes), called also butterfly fish by the fish fanciers, although it has no relation whatever to the butterfly fishes of the tropical seas.

The species has been known for some time to German aquarists, but has only recently been



HALF-MOON FISH
Side and front views. From a dead, mutilated specimen.

imported thence to this country, and was first shown at the public exhibitions of the Brooklyn and New York Aquarium Societies during the past fall. In December the New York Aquarium was fortunate enough to secure four specimens of this very attractive fish.

The species was first described in 1831 from Brazil and, although it has since been mentioned by a number of writers on South American fishes and is known to be widely distributed in British Guiana and Brazil, little or nothing seems to have been recorded concerning its habits and general natural history. It is said to be very common in the shallow waters of the upper Amazon region and that they may be most readily caught at night. So far as is known, there is only one species in the genus, which belongs to the family Cichlidae, a family which in its general ecology replaces the bass and sunfish family of North American waters.

The half-moon fish reaches a length of a little more than three inches, measured from the tip of the snout to the end of the middle rays of the caudal fin. It is very deep-bodied and quite compressed, the height being several times the thickness of the body. In color the body is dusky above and silvery below. A distinct dark bar extends vertically across the body through the eye, and a broader bar runs vertically from the front of the anal fin upward to the front of the dorsal, whence it is continued on the dorsal fin. There is a distinct dark vertical bar also at the base of the caudal fin. Fainter dark bars are found between the darker ones and also on the caudal fin. The dorsal and anal fins are extended into long filaments and lobes of the caudal fin are also similarly extended. The pectoral fins are unmodified, but the ventrals are enormously extended into long white filaments.

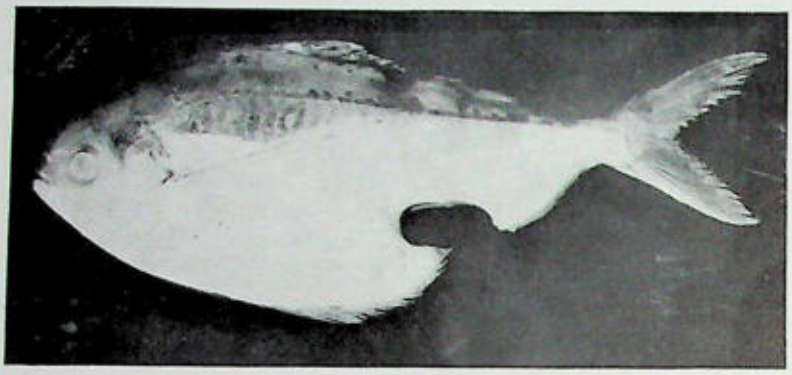
The species has a remarkable ability for rapid change of color and under excitement the dark bars become vividly and intensely black. The change appears to be practically instantaneous and the normal coloration may be resumed again with equal rapidity. This change is so great and so sudden as to be positively startling.

As these fishes require very warm water they are kept in a specially heated tank at a temperature of about 75 degrees.

The common name refers to the outline of the body with the dorsal and anal fins and is quite appropriate in the perfect adult fish. R. C. O.

REMARKABLE RECOVERY OF A WOUNDED FISH.

IT is well known that many invertebrates have remarkable powers of regeneration so that parts injured or removed by mutilation may often be entirely regenerated. Take, for example, the ordinary starfish, which can be torn in two with the result that each of the parts will eventually regenerate the lost organs, and develop into two perfectly formed starfishes. In some cases this may even go so far that a single detached arm of the starfish will evolve a whole new body with the other arms. Among vertebrated animals, however, this regenerative power is confined as a rule to the healing of wounds or to the redevelopment of comparatively unimportant parts of the body. Observa-



WOUNDED BUTTERFISH

tions have indicated and experiments confirmed that certain species of fish at least are able to regenerate the fins, provided they are not entirely removed at the base. When scales are lost by abrasion they quickly begin to grow again.

Fishes which show recovery from wounds of considerable extent are sometimes taken, but these are usually on the fins, gill covers, etc., and do not as a rule, indicate a very deep wound. The most remarkable case of recovery from a serious wound which has come to the writer's attention was that of the butterfish shown in the accompanying figure, which was taken in Buzzards Bay during the last summer. This was an adult specimen about one foot in length and was captured, along with many others of its kind, in the poundnet set by the collector of the United States Fisheries Station at Woods Hole, Massachusetts. This indicates that it had been travelling in a school with other butterfish and was not particularly incapacitated by the absence of the lost portion. How the wound may have occurred one can only conjecture, but from its nature it would appear that the portion had been bitten out by the sharp teeth of some predatory fish. Although the wound was so extensive, involving a large amount of muscular tissue and apparently going within a short distance of the body cavity and reaching nearly to the spinal column, the fish recovered in the condition shown in the figure. A large section of the anal fin was completely bitten out, leaving this region somewhat distorted even after recovery. The wound was entirely healed when the fish was captured, but there remained ample evidence of the healing process in the large amount of scar tissue which covered the wound and in the fact that the scales had not been regenerated over the scar, although the skin had reformed.

Numerous experiments have shown that when the skin or even the scales of a fish are removed from a considerable portion of the body, the fishes often die from inability to control the density of the body solutions. For a full explanation of this matter the reader is referred to the article by Dr. Scott on "The Relation of Aquatic Animals to the Water in which they live," in another part of this BULLETIN. Being a bony fish, the blood of the butterfish would naturally have only about one half as great a salinity as the sea water. How a fish with so much of the flesh exposed could manage to exclude excess salts until the skin was regenerated is a matter of conjecture.

FEDERAL CONTROL OF MIGRATORY FISH.

About three years ago when the question of Federal control of migratory birds was so seriously considered, it was felt that the Federal control of migratory fishes was of equal importance, and possibly more easily secured. Public sentiment, however, crystallized rapidly around the bird question, on account of the supreme importance of maintaining the birds, and through the efforts of public spirited men who clearly saw the dangers to which our birds were becoming increasingly exposed, the matter was brought to a successful issue by the passage of the Weeks-McLean Bill. Of even more importance on account of its relation to the public food supply is similar legislation requiring federal control of migratory fish.

Almost every state in the Union, by unwise methods, is unintentionally curtailing the public food supply through inadequate regulation of the food fishes.

The bill introduced by Representative Linthicum of Maryland, on August 26th, 1913, H. R. 7775, referred to the Committee on Merchant Marine and Fisheries, upon which a hearing will soon be held, is of very great importance to all classes of citizens, whether fisherman, fish dealers or consumers, and should have the support of every thinking person.

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Elwin R. Sanborn, Editor

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FISH CANCER INVESTIGATION.

There is no disease more dreaded by humanity than cancer. In recent years large amounts of money have been devoted to the study of this disease in special laboratories founded for the purpose, and to stimulate research in the medical institutions already established. Thus far all efforts to discover the cause of the disease or to find some infallible specific for its cure have been without avail.

Theories as to the cause of cancer have been numerous—their very numbers indicating their inadequacy. In these the cause has been referred to bacteria and other parasitic unicellular organisms of both plant and animal nature, to embryonic cells caught up by growth in other tissues and delayed in development, to a discordant pernicious growth of epithelial tissues, etc., etc. But thus far none of these has proved satisfactory. It is true that bacteria and other unicellular organisms have sometimes been found in cancerous growths, but efforts to connect them with the disease in the human have been unsuccessful.

In view of so much fruitless investigation, it would not be strange if those engaged in it had wearied of the search. However, the difficulties and reverses seem only to have stimulated them to renewed effort, and never has there been such an active research into the causes and treatment of any disease as exists today in regard to cancer.

Failing to find the cause of cancer in man himself, investigators have taken up the study of the disease in lower animals, in the hope of finding there the clue for which they seek. Cancer is known to occur in other mammals, in birds and in fishes. Similar growths have even been described in plants, though whether these may be attributable to a similar cause is somewhat doubtful.

Very recently Dr. Peyton Rous, of Rockefeller Institute, and Dr. Leo Loeb, of St. Louis, seem to have shown conclusively that certain cancers found in chickens are due to bacteria. According to newspaper reports of the work of Dr. H. R. Gaylord on fish cancer, not yet published in full, fish cancer also appears to be due to bacterial action, though this does not seem to have been positively proved, nor has the germ been discovered.

On account of the suggestion contained in the newspaper accounts, that fish cancer might be transmissible to higher animals, the preliminary account of Dr. Gaylord's work has attracted much attention and has served to cause considerable excitement and apprehension.

It is well known that certain kinds of fishes, particularly the salmons and the trouts, when reared artificially in hatcheries, often develop tumorous conditions of certain glands of the throat known as the thyroid glands; the condition being commonly called fish goitre. About four years ago, Dr. Marine and Dr. Lenhart, of the Medical Laboratory of Western Reserve University, published in connection with the Pennsylvania State Fish Commission, the results of extended experiments upon this fish disease, in which they showed that the fish thyroid disease is similar in general character to goitre in the human being. This was proved not only by the histological condition of the diseased gland, but also by the response to the iodine treatment, which has been so successful in cases of human goitre. At the same time they did not deny the posibility that actual cancer might develop in connection with the diseased tissues of the thyroid gland.

If the preliminary newspaper accounts of Dr. Gaylord's work are accurate, Dr. Gaylord believes that there is no dividing line between this goiterous condition of the fish and true cancer of the thyroid. Or, in other words, the two are mild and pernicious phases of the same disease. Dr. Gaylord has been unable to prove that the disease is infectious, although he made experiments in an attempt to discover this point. He apparently believes that some micro-organism is responsible for the spread of the disease, and attempted to infect higher animals, dogs and rats, by giving them to drink water in which the scrapings from the fish tanks had been placed. Some of these animals, in the

course of four to six months, showed indications of thyroid trouble (out not definite cancer) while others gave negative results. This matter is an extremely interesting and suggestive one, but apparently it will need to be substantiated by further experiments along the same line before it can be accepted. Though many efforts have been made by various investigators to inoculate healthy animals with cancer, all such experiments have failed except when the inoculation has been confined to the same variety of animal. Also, efforts to transmit the disease by feeding cancerous tissues have been unavailing, and this was the case even with Dr. Gaylord's experiments with fishes. While it is not beyond the range of possibility that the exciting cause of cancer might be transmitted in the drinking water, the failure of all efforts to transmit the disease directly must make us hesitate to accept the above mentioned experiments with dogs and rats as conclusive. Also, it must not be forgotten that parasites in general are very specifically related to definite hosts, so that the transmission of parasites from one species to another is, as a rule, impossible. Even among the mammals it usually has been found impossible to transmit parasitic diseases beyond the range of a single species.

The cause of goitre, like that of cancer, has been long sought for without success; but the two diseases have always been considered quite distinct, though of course it is quite possible for cancer to develop in diseased thyroid tissues.

As to the possibility of transmitting fish cancer to the human being, there is at present no occasion for alarm. Even if it were possible to inoculate human beings with fish cancer, which seems highly improbable, there could be no danger in eating fishes with incipient cancer, since cooking would naturally destroy anything which would tend to excite the disease in man. No one, of course, would care, on general principles, to eat fishes in which any disease was evident.

Thyroid goitre of fishes has been known in trout and salmon hatcheries for many years, where it is supposed to be due to over feeding, over crowding, and other unhygienic conditions, and it is known to respond readily to the iodine treatment and to greater cleanliness in the hatchery tanks and ponds. There has been no evidence of any increase in human goitre or cancer among the employees working in such hatcheries, or the people living in the vicinity and drawing their water supply from these sources.

There is, then, no cause whatever for alarm that cancer will become infectious because of the prevalence of this thyroid disease in certain dish hatcheries. R. C. Osburn.

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THE RELATION OF AQUATIC ANIMALS TO THE WATER IN WHICH THEY LIVE.

By Prof. G. G. Scott,
College of the City of New York.

"I marvel how the fishes live in the sea."—*Shakespeare.*

DID you ever wonder why fishes do not get drowned? Or how they can breathe in the water, which, after all, is really the same question as the other? Or how it is that they do not keep drinking water all the time? Or why a salt water fish dies in fresh water and vice versa? I am not going to answer these questions at all, but instead will discuss a bit of dry physics and chemistry as a proper setting for what apears to me to be a fascinating story.

When two gases are confined in the same vessel, they mix or diffuse into one another. Thus light hydrogen gas will diffuse downward into heavy carbon dioxide and the latter will diffuse up into the light hydrogen. The force is due to the difference in the partial pressures of the two gases. A similar behavior is observed when two solutions of different substances are brought into contact. Diffusion between the two continues until the concentration throughout the vessel is everywhere the same. The driving force by which this result is obtained in the case of solutions is called *osmotic pressure* and can be measured.

One of the most characteristic features of living things is that substances must pass to and fro between the external world and the living cell in order that that cell may obtain energy for its work and get rid of its waste substances. The cell wall is a membrane separating the living substance within from the material outside, and through this there must be an incurrent and excurrent stream of materials.

In the lower aquatic animals the entire body is surrounded by water and the substances which the cell needs are in solution. Although the simplest forms may take food particles directly into the cell, yet it soon occurs, in the evolution of more complex forms, that the cell can absorb its food in liquid form only; and if the food at hand is not in liquid form the cell secretes a solvent which changes the solid food into the form of a solution. In higher animals with many organs composed of a multitude of cells, the blood carries the food in soluble form to all the various cells of the body. But these substances had first to get into the blood, and in every step they must pass through membranes. So we observe that there is a constant and repeated passage of materials in and out through membranes formed of cell walls.

We said above that when two solutions of different concentration, or of different osmotic pressure, were confined in the same vessel, the molecules undergo a change of position until finally a condition of equilibrium is attained. If we stretch a permeable membrane across this vessel, dividing it into two compartments, and place a solution of low osmotic pressure in one and a solution of great osmotic pressure in the other, a condition will soon obtain in which the osmotic pressure will be the same on both sides of the membrane. This process probably plays a great part in the life of the cells of the body. The degree of permeability of cells to various substances has been the subject of much investigation.

The waters of the ocean contain solutions of salts of various kinds, one of the principal salts, as every one knows, being sodium chloride or common salt. Now the osmotic pressure of ocean water is a little over 22.4 atmospheres, the pressure of one atmosphere being 15 lbs. to the square inch, so the driving force of the molecules in such a solution is very large. The Mediterranean Sea is saltier than the ocean, hence the osmotic pressure, about 28 atmospheres, is greater even than that of the ocean. The Black and Baltic Seas receive a great deal of fresh water and hence are less salty than the ocean, and so the osmotic pressure of these waters is less than that of the open ocean. The water of New York Harbor is very dilute, due to the great volume of water flowing in from the Hudson River, and the osmotic pressure is only a little over one half that of ocean water. Distilled or pure water of course contains no salts in solution, hence its osmotic pressure is zero. The osmotic pressure of spring water or river water is very small, being less than half an atmosphere. When pure distilled water is taken in great quantities into an empty stomach, we have a solution of no osmotic pressure bathing the walls of cells, whose osmotic pressure, in the human being, is about 7 atmospheres. The great difference in osmotic pressures causes injuries to the cells. The small amounts of salts present in our drinking waters are just sufficient to counteract this. The harmful effect of eating snow and ice is relevant to this action, since snow and ice are practically frozen distilled waters.

Now aquatic animals inhabit all the waters of the earth, which present a great degree of

variation as far as the content of dissolved salts is concerned, and therefore of their osmotic pressures. What is the relation of all the various groups of aquatic animals to the external medium? As far as we can say the osmotic pressure in the cells of an animal is probably the same as that of the blood, which can be easily measured. Now, aquatic animals could adapt themselves to the osmotic pressure of the water in various ways. For example, they could construct membranes at the surface of the body in such a way that these membranes would be absolutely impermeable to the external medium. In the second place, all parts in contact with the water could be freely permeable so that the interior of the cells would be practically living matter or protoplasm permeated with the water and with its salts in the same proportion as they exist in the water. Or, thirdly, some of the parts in contact with the water could be freely permeable and other parts less so.

Undoubtedly the first animals were formed in the sea and the same salts were present in this primeval living organism as are found in the sea and in the same proportions. Even in the jelly fishes, which are somewhat complex animals, this is true, and they are in perfect osmotic equilibrium with the sea. Later arose animals like the crustaceans with their hard external parts. They have certain structures which protect them from the sea without, yet even here also, on account of the permeability of other parts, the blood is in osmotic equilibrium with the sea water. While in higher forms, like the mollusks and the crustaceans, the animal is not as freely open to the sea as is the jelly fish, nevertheless the blood has the same osmotic pressure as that of the sea water. For example, if we studied these animals from the Mediterranean, we would find that the osmotic pressure of the blood is like that of the water from that sea. In the more dilute waters of the Baltic, the blood has the same concentration as that of the water outside. Moreover it has been shown experimentally that the osmotic pressure of the blood changes according to the external medium.

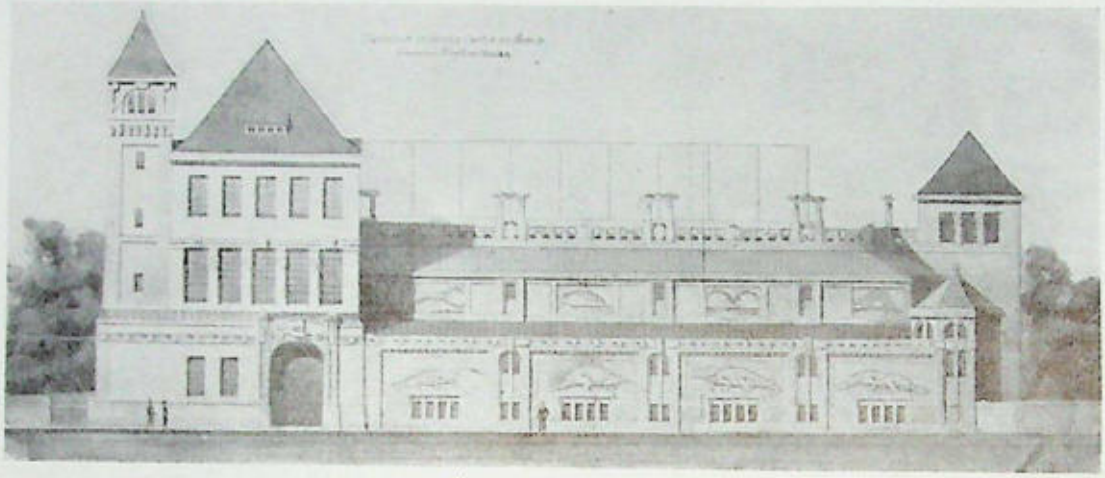
Now, of course, there are limits to which this change can take place. We might say that living matter is so constructed that its activities can be manifested only within a certain range of external conditions. The osmotic pressure of the human blood is quite constant at about seven atmospheres. The blood of the marine invertebrates along our shores, as we have seen, is equal to about 22.4 atmospheres, and is even higher than this in the case of those forms found in the Mediterranean and much lower in those found in the Baltic. The range of osmotic pressures which the blood of these lowly forms may take and yet be compatible with life is large.

If, as we have said, the blood of these forms becomes modified—i. e., more dilute as the external medium is made more dilute—water must get into the blood of the animal or the salts of the more concentrated blood of the animal must get out. It is probable that both changes take place. But through what part of the body? Three possible structures have to be examined. These are the skin on the surface of the body, the wall of the intestinal tract and the gill membranes. Observation and experiment show that it is probably through the gills that the exchanges usually take place—for example, when an oyster is "fattened" by being placed in fresh water, water enters and salts leave the oyster through the gills, with the result that the oyster swells up.

Oysters sometimes grow in very brackish or even fresh water. This is explained by the fact that marine invertebrates placed in a medium differing in density from that to which they are accustomed, immediately respond by losing salts and taking on water to the end that soon their osmotic pressure is near or the same as that of this external medium. Of course, if they were placed at once in fresh water they would die, but it is quite possible that, by subjecting some of these invertebrates to successive small reductions in the density of the water, we could finally get them to live in fresh water.

Biologists tell us that the sharks and skates are among the lowest of the fishes. In the osmotic pressure of their blood they resemble the marine invertebrates. That is, it is the same as that of the external medium. The blood of sharks from the Mediterranean is more concentrated than that from sharks of the more dilute Atlantic ocean. However, extensive experiments have shown that, while these animals resemble their invertebrate ancestors in this respect, the change is not as great as that which occurs in invertebrates under the same conditions. In a certain series of experiments carried on by the present author it was found that the changes induced in the osmotic pressure of the blood of dog-fishes were about one-fourth of the magnitude of the changes made in the external medium. A shark would, of course, be killed in fresh water.* I found that the

*It must not be forgotten that one species of shark (*Carcharias nicaraguensis*) occurs in Lake Nicaragua in absolutely fresh water. R. C. O.



THE NEW BERLIN AQUARIUM

osmotic pressure of the blood of dog-fishes in the New York Aquarium was distinctly lower than that of dog-fishes from Buzzards Bay, where the water is much more concentrated than the dilute harbor water in which the fish live at the Aquarium. But the blood of these Aquarium dog-fishes would not have as low an osmotic pressure as that of invertebrates living in the same water. (This conclusion is drawn from what we know of the behavior of the invertebrates and not from actual observation.) The point is that the sharks and shark-like fishes are to a certain extent independent of the osmotic pressure of the external medium, whereas the invertebrates have little if any means of protecting themselves.

But what shall we say of the marine bony fishes (cod, mackerel, etc.) which, in contrast with the sharks and marine invertebrates, have an osmotic pressure of the blood considerably less than one-half of the sea water in which they live? Important changes in the blood have taken place, and in these fishes the gills have become practically impermeable barriers to the more highly concentrated outside medium. In spite of the fact that the sea water has an osmotic pressure of over twice that of the blood of these fishes, the diffusion of its salts is prevented. The parts of the body exposed to the sea water of such high osmotic pressure are constantly bombarded, so to speak, by the high pressure without. The scales covered with the slimy membrane effectually prevent the changes taking place through the skin, the wall of the intestinal tract is equally efficient, and the gill membranes, through which the gaseous exchanges must still take place between the blood and the water, are so modified that they also act as barriers to the high salt pressures without. In our study of the osmotic pressures of the blood we find no connecting links between the conditions found in sharks and those found in the bony fishes.

It has been found that the osmotic pressure of the blood of fresh water bony fishes is slightly less than that of the salt water forms. The fresh water streams and lakes, in all probability, became inhabited by forms which had their original home in the sea. In this adaptation the blood has become slightly modified from the condition found in the marine bony fishes. This would go to show that, whereas the bony fishes are practically immune to the ordinary high external pressures, yet extreme changes in these would produce some effect. Thus I found that the blood of the tautog living in brackish water at the New York Aquarium had an osmotic pressure slightly less than that of the same fishes living in the more concentrated waters of Buzzards Bay. Furthermore, if the bony fishes are affected in no way by the changes in the osmotic pressure of the external medium, then we would expect that the blood of the anadromous bony fishes, which go from the sea to fresh waters or back again, would remain practically stationary under these changed conditions. But this is not the case, for, as Greene found in the case of the Chinook salmon, the blood has a slightly lower osmotic pressure in the fresh waters of the spawning beds as compared with that in sea water. Dakin in England found the blood of the eel in fresh water slightly different from that of the same species in the sea. I have noted a similar condition in the white perch. The osmotic pressures of the blood of these



THE AQUARIUM, MARINE PARK, BOSTON.
By permission of the *American Architect*

forms is not quite as high as that of exclusively marine nor as low as that of exclusively fresh water forms.

The amphibians (or frogs, toads and salamanders) are fish-like in the tadpole stage, and have about the same osmotic pressure of the blood as the fresh water fishes. It is of great interest to note that, when they emerge from the aquatic stage to lead a terrestrial life, they take with them on the land the same kind of blood which was developed in their fish-like bodies. We suppose that the reptiles arose from the Amphibia, and reptilian blood has an osmotic pressure quite similar to that of the frogs. The birds and mammals were divergent lines of evolution from the reptiles, and the osmotic pressure of the blood is similar to that which preceded. In this way we can explain the presence of salts in our own blood today. It is an inheritance carried along through all the ages during which the living world has evolved. It came about in the first place in the creation of living matter in the sea, and the salts of the sea played, and to this day play an important part in the processes which we call living. Professor A. B. MacCallum has shown that our blood today contains the same salts in the same proportions as they existed in the seas of primeval days.

It becomes continually more evident that to properly understand man and the other mammals, we must study the lower forms, too. Scientists have already devoted a great deal of attention to structures; they will give more attention in the future to the study of the evolution of living processes.

NEW AQUARIUMS IN AMERICA AND EUROPE.

TWO American cities outside of New York have supplied themselves with public aquariums of considerable size. A photograph of the aquarium in Boston, opened about a year ago, is shown in this number of the BULLETIN. The building is attractive both inside and out, and is equipped with fresh and salt water tanks. The collection is small as compared with that of the New York Aquarium, but is well

exhibited. The Boston Aquarium has been a popular institution from the start, and had, it is understood, nearly a million visitors the first year.

The aquarium in Detroit, of which, unfortunately, no picture is available, was opened in 1904. The building is 260 feet long by 72 feet wide, and is now visited by more than a million persons a year. It contains both fresh and salt water equipment and collections.

The aquarium in Philadelphia, which has been in operation for a couple of years, is situated in Fairmount Park and is installed in an old building which originally formed part of the city water works. Although handicapped by its location in a structure of this kind, it is well patronized by the public, and additional and larger exhibition tanks are being installed.

The new aquarium in Berlin, a picture of which is presented in this BULLETIN, is situated on the Kurfurstendamm, near the elephant gate of the Zoological gardens. It contains in the lower story the aquarium proper, the room being equally divided between fresh and salt water, with fourteen large tanks and twenty-five smaller ones. An upper floor is devoted to terraria, with nineteen large and about sixty smaller receptacles for reptiles and amphibians. A large glass-covered room is constructed to hold a tropical creek, with sandbanks upon which crocodiles may bask and pools in which turtles may swim about, while the border is planted with bamboo. The uppermost story houses an insectorium.

In another portion of the same building are administration and service rooms and laboratories for scientific study. In the basement are located the pumps and reservoirs for both fresh and salt water. A water tower contains distributing tanks which supply the aquaria with water directly.

The public aquarium idea has taken a pretty firm hold in this country, and doubtless we shall soon have as many as Europe. The city of Chicago is now making great efforts for the establishment of an aquarium and will probably have one before long. The Director of the New York Aquarium has been from time to time called upon to furnish information relative to its equipment, to officials of most of the large cities in the country.

There is every reason to believe that a large aquarium will be a feature of the coming Panama Exposition in San Francisco, and certain public-spirited citizens are exerting themselves to have it made a permanent feature of the city of San Francisco. C. H. T.

THE INCREASED UTILIZATION OF CARP.

PROBABLY no fish has been the subject of more discussion regarding its edible qualities than has the German carp. Moreover it would be difficult indeed to imagine a wider range of opinion in regard to the general economic status of any fish. Among the advocates of the carp there are those who consider it a delicacy; those who consider it a coarse food suitable especially for the poor, to whom it may afford a sufficient quantity of a meat diet at a low price, and those who value it only as a source of food for the game fishes. On the other hand, there are those who consider it as unfit for food for anyone at any price; who believe that it is highly destructive to our native game and food fishes by devouring eggs, by destroying breeding places and by fouling the water; who mark it with the stigma of "spawn eater," and who would eradicate it from our waters entirely.

The original home of the carp is in eastern Asia. Just when it was introduced into Europe seems to be problematical, but it reached England as early as 1514. According to DeKay it was introduced from France into the United States in 1831, by Henry Robinson, and was reared successfully by him in his ponds at Newburgh, N. Y. In 1872 Mr. J. A. Poppe introduced five small carp from Germany into his private ponds at Sonoma, California. The offspring of these fishes were distributed to numerous places in California and thus the carp industry of that State was established. (Report U. S. Commissioner of Fisheries for 1878.)

The vogue in carp raising dates from 1877, when, under the influence of the late Professor Spencer F. Baird, then United States Commissioner of Fisheries, they were again introduced and widely heralded as most desirable pond fish. Within a few years carp ponds became very common throughout the eastern and central states. As a rule the farmers who constructed these ponds became discouraged in a short time, upon finding that the carp had to be fed if they were to grow and multiply rapidly, and that when taken from stagnant, muddy ponds they did not possess as fine a flavor as they had been led to expect. The breaking of dikes and water gates in time of freshets permitted the carp to escape to the streams and lakes, where they at once proceeded to establish themselves.

They have now become so widely distributed in the larger lakes and streams that their eradi-

cation is impossible, however desirable such a project might be. Like that uncontrollable pest, the English sparrow, they have come to stay. However, the carp is not, like the sparrow, an unmitigated nuisance. It is true that he sometimes eats the eggs and destroys the breeding places of more desirable fishes and disturbs the waters continually, but at the same time the carnivorous fishes take a heavy toll of young carp for food. But what is of much greater importance, the carp is gradually finding a market, especially in the larger cities, that bids fair to have a place in the much-discussed reduction of the high cost of living.

Just how important this is becoming may best be judged by recent published reports. Thus carp are stated to be the most valuable commercial fish of the Illinois River, which yields a total annual product of twenty-four million pounds of fish. One hundred and fifty tons of carp are reported to have been taken thus far this season in the Kalamazoo River, Michigan. Sandusky, Ohio, is a great center for the carp industry, and supplies especially the large eastern markets of New York and Philadelphia.

A new type of fishing industry has grown up in connection with the shipment of live carp from Sandusky, especially to the eastern markets. Although this business is now only about three years old, it is estimated that from 500,000 to 1,000,000 pounds of live carp are now shipped annually from Sandusky, in which place this work has become one of the most important lines of the fish industry. The methods employed are outlined in the *Fishing Gazette* (January 3, 1914).

Shipping the living fish in quantity to a distance of 600 miles appeared at first to be a difficult problem, and the first attempt, made some three years ago, to send a carload of 6,000 pounds met with so little success that only 100 pounds remained alive when the car reached its destination. Specially built cars, provided with tanks in which the water can be aerated with an air pump and in which the temperature can be regulated, have at last solved the problem so satisfactorily that now seldom more than 100 pounds are lost in a carload of 6,000 to 10,000 pounds. Several cars are loaded each week at Sandusky and are rushed through by fast express.

The extensive marshes and shallow water areas, together with the slow flowing streams about Sandusky Bay, are the chief sources of these carp. When caught, the fishes are held in pounds and large live cars until they can be shipped, and shipments are made all the year round except when the ice prevents the removal of the carp from the pens. As the carp are worth only four and one-half to six cents per pound at Sandusky and bring fifteen to twenty cents per pound alive in the eastern markets, there is still considerable room for profit after transportation charges are deducted. When the carp are shipped dead they bring only five to eight cents per pound on the New York markets, so there is left an extra margin of about ten cents per pound to pay for the greater expense of handling them alive. Furthermore, there can be no doubt that they are far more edible when shipped alive, as they are given time in the pens and during transit to get rid of the mud from the intestines, which causes the flesh to be so permeated with its ill flavors when carp are allowed to die immediately after they are caught.

Under favorable conditions carp reach a marketable size in one year, sometimes attaining the length of one foot in nine or ten months. A three-year-old has been known to weigh thirty pounds, though an average weight at this age is probably only about three or four pounds. According to Dr. T. H. Bean (Fishes of New York) the carp increases in size up to the thirty-fifth year and has been known to reach a weight of ninety pounds. The carp will spawn when one year old and, as a four or five-pound female will produce 400,000 to 500,000 eggs, the rapid increase of the species in favorable conditions is easily understood.

While carp will eat almost anything, they live chiefly on vegetable food and may be fed on the coarsest diet, such as cabbage, potatoes, corn, etc. Apparently the rate of growth is dependent chiefly on the amount of food they can consume and there seems to be no limit to their appetites. While they are found to some extent in clear streams and rivers, they seem to thrive best in the sluggish back waters and bayous of slow flowing streams, and in marshes that are often almost uninhabitable by any other food fish. Thus it happens that the chief centers of the carp industry are found in such places as the Illinois River and the extensive marshes of northern Indiana, Ohio and southern Michigan. If they would only limit their distribution to such localities no one would have the least cause for complaint.

Because of the habits of the carp the flesh is usually somewhat ill-flavored and muddy to the taste, unless proper care has been taken to rid it of this objectionable quality. If the freshly caught fish is thoroughly bled and cleaned at

once when taken and then placed in salt water for a few hours, the muddy taste disappears; but it should never be allowed to lie with the entrails and blood in it. Still better is the method of keeping them alive in pure water for a few days until the intestine has been emptied and the blood purified as in the process of marketing alive.

Dr. E. E. Prince, Dominion Commissioner of Fisheries, in his annual report has taken up the cudgels against the further introduction of carp into Canada. In stating the arguments for and against this fish Dr. Prince admits the following points in favor of the carp:

1. It has some value in the United States markets and is regarded by some persons as possessing edible qualities.
2. There are inferior waters adapted for carp culture.
3. They are reared with little difficulty.
4. They are very prolific and grow rapidly on very poor food.
5. Some anglers find carp fishing an enjoyable pastime.

Against these he opposes the following arguments:

1. The cool, pure waters of Canada are well adapted for fishes superior in quality to the carp.
2. Carp are nomadic in their habits and, like undesirable weeds, spread everywhere.
3. They are voracious and omnivorous.
4. Their market value (in Canada) can never be great.
5. They consume the food of better fish and multiply so fast that they are injurious and even destructive to the better kinds.
6. They ruin the waters by destroying vegetation, rooting up the banks and disturbing the bottom.
7. They are destructive spawn eaters and no spawning ground is safe from their attacks.
8. They are especially subject to parasites and contagious fish diseases.

Mr. Louis Radcliffe, of the Bureau of Fisheries, defends the carp (Fishing Gazette, January 31, 1914) in reply to Dr. Prince's attack, and gives figures showing the rapid growth and great importance of the industry. In 1908, Mr. Radcliffe points out, with figures taken from the census report, the yield, of carp amounted to 42,763,000 pounds, valued at $1,135,900, equal to 2 per cent. of the total value of all fisheries products, including shellfish, etc. From seven of our inland states, Illinois, Ohio, Michigan, Missouri, Wisconsin, Iowa and Minnesota, were taken nearly a million dollars' worth of this fish. In Illinois the value of the carp was greater than that of all other species combined. Even in 1908—and the carp industry has increased rapidly since that time—the carp was outranked in value in the United States by only six species, viz.: salmon, cod, shad, squeteague, halibut, and haddock.

Probably Professor Prince is quite right in arguing that no fish culturist should determine to introduce these fish without fully considering the grave possibilities associated with their cultivation, and perhaps it would have been better if the carp had never been introduced into American waters. However, since they are here and since there is no possible means of getting rid of them, and since they will probably spread throughout our waters in the course of time, it is encouraging to note that these fish are beginning to find favor in the market, that the demand for them is steadily increasing, and that the method of marketing them alive has been perfected, thus insuring a much better article of diet than when handled in any other manner.

From the standpoint of the sportsman the carp undoubtedly makes a nuisance of himself by destroying the spawn and food of the more desirable game fishes, and perhaps he may even prove to be a serious menace to fishing industries based on the more desirable food fishes of the fresh waters. However, if this much maligned alien will only help to solve that ever increasing and difficult problem, the high cost of living, for the considerable portion of our population who are not anglers and who are unable to afford the more costly foods, he may prove in the end a not altogether undesirable citizen.

R. C. Osburn.

EUROPEAN BLIND SALAMANDER.

ALONG with other material from Europe, received early in December, were two living specimens of the blind cave salamander (*Proteus anguinus*). The family Proteidae, to which this salamander belongs, is, so far as known, limited to three species, each belonging to a different genus. The other species are the common mud puppy (*Necturus maculatus*) of eastern North America, and the blind salamander (*Typhlomolge rathbuni*) from artesian wells of Texas.

The mud puppy is always kept on exhibition in some numbers at the Aquarium. While they are nocturnal in habit the eyes are fairly well



EUROPEAN BLIND SALAMANDERS

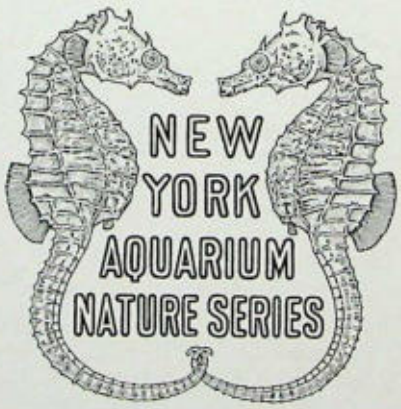
developed, although, as in the others of the family, there are no eyelids. The subterranean *Typhlomolge* from Texas, which is entirely blind, has been exhibited twice at the New York Aquarium, the specimens coming from deep artesian wells at San Marcos. The Proteus has not before been exhibited.

This species inhabits subterranean waters of Carniola, Carinthia and Dalmatia, about the head of the Adriatic Sea. "The vast caves of Adelsburg, not far from Trieste, are especially celebrated for the occurrence . . . . of this animal. The river Poik disappears into the limestone hills and rushes through enormous stalactite grottoes . . . . There deep down below the surface, in absolute darkness, in an almost constant temperature of about fifty degrees Fahrenheit, is the home of *Proteus*."

The species reaches nearly a foot in length and our largest specimen is about nine inches long. As might be expected in the case of a cave species, the body is colorless, except that the blood gives a slight pinkish tinge to the body, and the three pairs of external gills are brilliant carmine. According to Gadow, quoted above, "the white skin is almost as susceptible to light as is a photographic plate. If light is not absolutely excluded the white skin becomes in time cloudy, and if exposed to strong light the whole animal turns ultimately jet black." Though our two specimens have been kept in the same tank, exposed to strong daylight since their arrival on December second, one of them shows no indication whatever of any color change. The other specimen has become almost uniformly light grey.

Although constant effort has been made to induce our specimens to feed, they have as yet eaten nothing; but, according to Gadow, specimens are known to have existed for years without taking any nourishment. They swim readily in an eel-like manner in the aquarium jar. Occasionally they may rise to the surface to take a new supply of air into the lungs, after which they usually drop without any muscular action toward the bottom. Sometimes they may come to rest upon the plants in the aquarium, and may remain in this position for some time without moving.

The limbs of this species are very small and degenerate. The fore limbs are provided with three toes. The hind limbs, which are somewhat smaller, have but two toes. The vestigial eyes are entirely covered by the skin of the head, and thus are scarcely visible. The tail is strongly keeled above and below, for the purpose of swimming. In the aquarium tank they appear much more active than the mud puppy, crawling about over the vegetation and occasionally swimming actively.



Another publication in this series has just made its appearance under the title, "The Care of Home Aquaria," prepared by Dr. Raymond C. Osburn, Assistant Director of the Aquarium. Ever since the opening of the New York Aquarium there have been constant calls for information in regard to this subject. In the New York Zoological Society BULLETIN for April, 1903, Director Townsend gave a brief discussion of the subject. The BULLETIN for March, 1912, was entirely devoted to a discussion of "The Balanced Aquarium," by Dr. Osburn, but the edition of fifteen hundred copies was exhausted by sales at the door within a few months.

Still the demands for information did not cease and to meet this need the present work,



AN OLD PRINT OF THE AQUARIUM BUILDING

which is an amplification of the article in the 1912 BULLETIN, was prepared and is now offered for sale. The volume of sixty-four pages with twenty-nine cuts, is devoted especially to the methods of setting up, stocking and caring for balanced aquaria suitable for the home and classroom. Some of the topics discussed are: The meaning of balance, temperature, planting the aquarium, stocking the aquarium, feeding, cleaning, marine aquaria, diseases and parasites, etc., etc. The booklet in paper cover may be obtained from the New York Aquarium for twenty-five cents.

ANOTHER OLD PRINT OF THE AQUARIUM.

The Aquarium building, long known as Castle Garden, has been put to many uses and subjected to many alterations in its century of service. The Aquarium library has gradually acquired a collection of old time prints which present many different aspects of the structure.

Originally it was a circular fort. During the many years when it was used as a landing place for immigrants it acquired superstructures and was surrounded by accessory buildings. When it became an Aquarium the upper story was remodeled to some extent and the surrounding buildings removed. Prior to 1869 it was brought within the limits of Battery Park by the filling in of the shallows and the construction of the sea wall which now encloses it.

Some of the prints referred to have been republished in the bulletins and annual reports of the New York Zoological Society, as follows: BULLETIN, April, 1907; April, 1908; March, 1910; ANNUAL REPORT, 1906. A photograph of the bronze tablet placed on the building in 1909 will be found in the BULLETIN for March, 1910. The date of the print reproduced in this number of the BULLETIN is not set forth on the print, but it was of course prior to 1869.

C. H. T.

ATTENDANCE AT THE AQUARIUM.

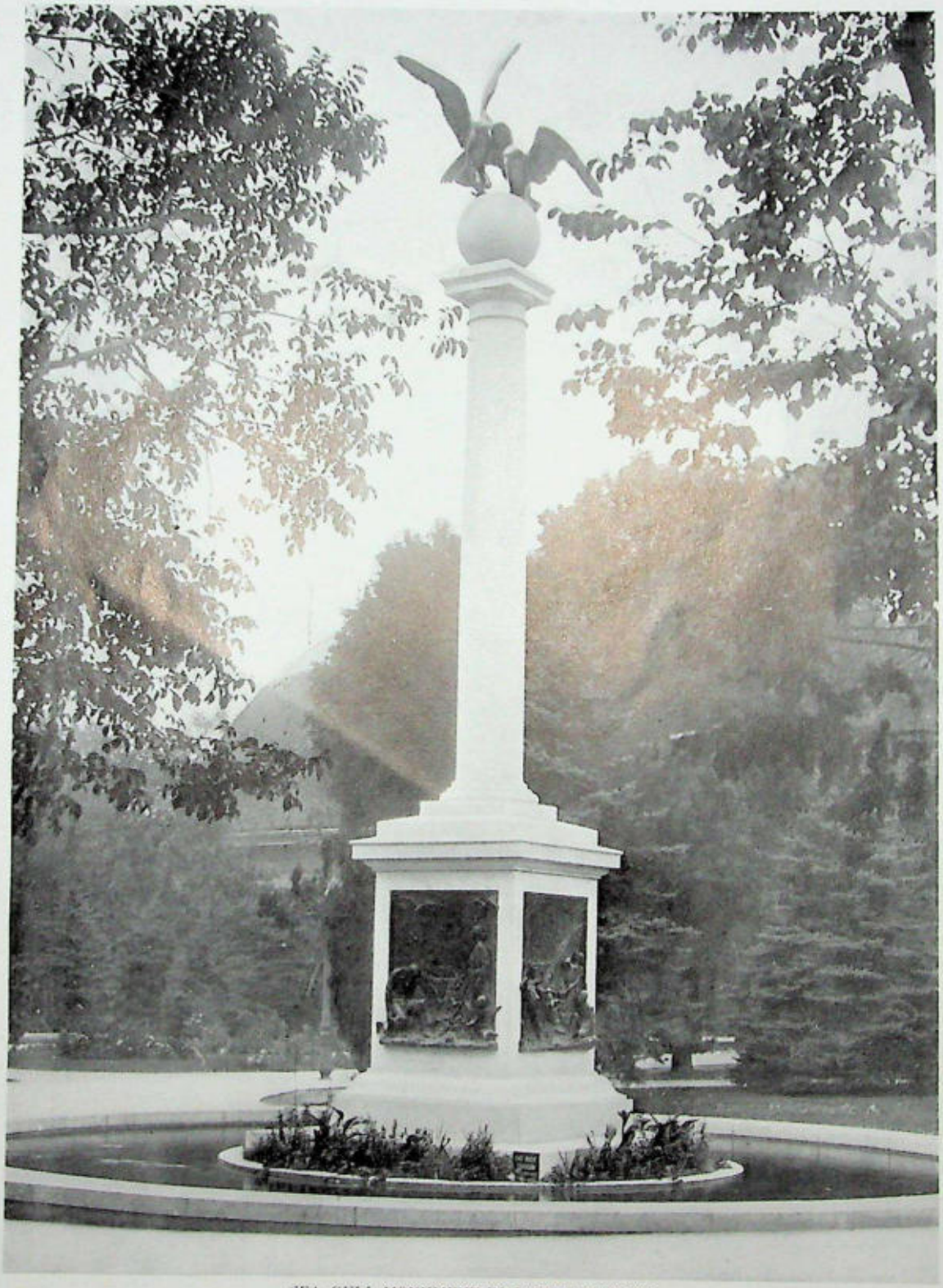
During the year 1913, the total attendance at the New York Aquarium was 2,205,729. This is an average of more than six thousand persons a day. The attendance has increased slowly from year to year, notwithstanding the fact that the exhibits cannot be increased nor greatly altered in the present building.



ZOOLOGICAL SOCIETY BULLETIN

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SEA GULL MONUMENT IN SALT LAKE CITY

Erected in remembrance of the gulls that saved the crops from destructive insects.

ZOOLOGICAL SOCIETY BULLETIN

Published by the New York Zoological Society

VOL. XVII MAY, 1914 NUMBER 3

A TRIBUTE TO THE SEA GULL

By G. O. SHIELDS.

VISITORS to Salt Lake City will hereafter have the privilege of beholding the first monument ever erected by grateful people to any bird. We have monuments all over the civilized world, commemorating the deeds of great men and events of every sort, but never before has man expressed his appreciation of the work of insect-eating birds by such a tribute.

A photograph of the Gull monument is shown as the frontispiece of this issue of the BULLETIN, and herewith appear two of the bronze tablets which decorate two sides of the pedestal.

The story that the monument stands for is interesting, quite to the verge of romance. In 1848, a year after the first pioneers had settled in the great Salt Lake Valley, when their first wheat crops were growing and represented well-nigh the sole sustenance of the colony for the coming year, the tradition exists that hordes of grasshoppers descended from the adjacent mountains and began to devour the grain and everything else that was green in the valley. The pests moved in a line that was miles in length, like a great army going into battle, and devoured every vestige of vegetation, leaving the ground behind them looking like a bed of ashes. The settlers were heartbroken, and panic-stricken, because they saw starvation stalking behind them.

Down at the lake, a few miles away, so the legend goes, were thousands of snow-white herring gulls, and the visitation of grasshoppers did not long escape their keen eyes. There was a great commotion among the flock of gulls, and those flying in the air in every direction seemed to be calling to their mates to go to the fields and help destroy the insects.

The birds soon located the invading army, circled over and about it, then swooped down upon it and began to devour it. The insects were powerless to offer resistance, and the birds scooped them up literally by millions.

As fast as the foragers loaded their crops to their full capacity, they took wing and flew away to the banks of a neighboring creek, to digest their great load of grasshoppers, while others took their places in the work of destruction. And so the slaughter went on through the day. At night the gulls returned to the lake, but at dawn the next morning they were again on the scene of action; and they continued until the army of grasshoppers was literally annihilated.

The pioneer farmers and their wives were filled with gratitude, and many of them fell on their knees and returned thanks for their deliverance from the starvation that had stared them in the face. From that day to this, the descendants of these early settlers have held the gulls in grateful memory. It has been generally known throughout the state of Utah that any man or boy who would dare to kill one of these birds would be liable to pay the penalty with his own life, and so far as is known, in all these years no one ever has killed one of these birds in that state.

A few years ago the gratitude of the people of Salt Lake City to their deliverers took tangible shape. A young newspaper reporter, named Isaac Russell, and who is now on the New York *Times*, wrote a Christmas story for



THE DESTRUCTION OF THE CROPS AND THE COMING OF THE GULLS.



REAPING THE HARVEST.

one of the Salt Lake City papers in which he recounted the great achievement of the gulls, and said that the people who were directly interested should build a monument to that species.

Fisher Harris, who was Secretary of the Commercial Club, at once took up the suggestion, and started a movement among the well-to-do people, which resulted in the raising of $40,000, with which to defray the cost of a monument.

Mahonri Young, a young sculptor and a grandson of Brigahm Young, now a resident of New York City, was commissioned to design and build the monument. He performed his task sympathetically and well, and the result was unveiled October 1, 1913.

The monument consists of a granite shaft fifteen feet high, on top of which rests a great ball, and on this two gulls in gilded bronze, are in the act of alighting. The pedestal bears four historic bronze plaques, in relief, and is surrounded by a fountain forty feet in diameter, in which goldfish disport themselves, and lilies and other water plants are growing.

The people of the state of Utah have thus set an example for the world; but unfortunately there are few instances where birds have been permitted to work out the complete salvation of the farmer from his insect enemies. The birds are trying it every day, all over the land, but they are met at every turn by bloodthirsty men and boys, armed with guns and reenforced by dogs, and the majority of the farmers whose property these birds are trying to protect, allow the vandals to range over their fields far and wide, and hunt the birds to death.

GORILLAS IN THEIR OWN JUNGLE.

DURING the past twenty years I have, from time to time, kept gorillas on my premises for the purpose of studying their vocal sounds, habits and mental faculties. In all, I have had twelve specimens, and some of these for several months in succession. Besides this I have spent most of that time in the chief centers of gorilla populations, where many good opportunities were afforded for studying them in a state of nature. From these various sources I have gathered many facts not generally known to the scientific world: but the space here available precludes an elaborate report of them. I shall therefore confine myself to a brief account of two specimens that I have on hand at this time.

"Dinah" is a young female, now apparently about three years of age, and beyond question, is the finest specimen of her race that I have ever seen in captivity.

As a rule, the gorilla is stoical, morose, often sullen, and evinces a strong aversion to human society. Some individuals, even after months

of patient care and kindness, remain spiteful and ferocious; but "Dinah" is a conspicuous exception to the rule. When I first acquired her, a few days after she was captured, she was as vicious and savage as any that I have ever seen; but now, after five months in captivity, she is as tame and playful as a house cat.

"Dinah" is the only gorilla that I have ever known to attempt a laugh or even a smile; but she does both. When tickled under the arms or on the bottom of the foot, she chuckles audibly, in a manner closely verging on a real laugh, and she seems to enjoy being tickled. She is a real tomboy, and often challenges me for a romp. Frequently when I enter her big cage, she climbs upon my shoulders or head, or slaps my cheeks in a most human-like fashion, beats a tattoo on my back, or snatches off my hat as a mischievous boy would do. She has a real sense of humor, and it often manifests itself in pranks which clearly indicate that she is conscious of being funny.

Her varied poses on the trapeze are quite unique, and some of them would arouse the envy of a professional acrobat. She often indulges in a game of solitaire football. She clutches a bunch of straw between her feet, and, using her arms as crutches, rushes across the floor of her long cage, tosses the wisp against the wall, then catches it in her hands and scuffles with it in a boisterous manner, as though it were some living thing trying to get away from her. After a bout or two at this she occasionally rises to an erect position and beats a rousing tattoo on her breast with her hands; striking alternately, with surprising rapidity and force.

To watch her movements and expression in searching for the gorilla behind a mirror is not only amusing, but is a study of animal psychics worthy of attention. With great caution she reaches her arm around the mirror and feels for the image. Not finding it, she peeps over, and under and around the sides of the glass. To her it is a strange elusive ape, and she has never become convinced that it is not a real gorilla. The interest, anxiety and disappointment in turn depicted in her black face are too human-like to be imagined on the visage of an ape, but she never tires of the futile search. Nothing else that she sees seems to interest and absorb her so profoundly as that mysteriously vanishing gorilla behind the mirror.

The companion of "Dinah" is a young male, perhaps not more than eight or nine months old. Because of his persistent habit of charging at windmills in the early days of his captivity, I named him Don, in honor of Don Quixote, whose historic capers he so zealously emulates. Don is a timid little waif; but not malicious. His nerves are highly strung and he is very easily excited, but gradually he is becoming more tame as he becomes accustomed to his new surroundings. However, in three months he has made less progress along that line than Dinah did in half the time, although she was much less tractable at first than he was.

A practical joke that seems to afford her great amusement is frequently played upon her little companion. While he sits quietly nibbling at some morsel of food, she rushes across the cage and in passing him, throws out one leg, hooks her foot about his neck and tumbles him sprawling on the floor. He invariably cries, and sometimes swears; whereupon she runs to him, helps him up, caresses him in a motherly fashion, and then repeats the joke, perhaps a dozen times in a day.

The difference in temperament in these two apes is as distinct and pronounced as that of any two human children of corresponding ages. Dinah is a real rollicking rowdy, with an air of "rough house" in every act and gesture, while Don is as prim and stoical as a wooden Indian. Nothing resembling a smile ever softens the rigidity of his spectral countenance and the deep searching stare of his grave eyes is like that of an inquisitor. Dinah is as fat and buxom as a pet pig, and eats like a gourmand, while Don is as lean as a lath, and breaks and minces his food as daintly as an epicure. She eats five or six times as much as he does, and if not constantly watched while eating she invariably robs him of whatever he has.

In so far as their dietary is concerned, both of these apes are now fairly well civilized, which is a great consummation. They both eat bread, various kinds of cooked meats either fresh or cured, sweet bananas, mangoes, pineapples and other cultivated fruits in certain stages of ripeness. Nevertheless, they are rather capricious and sometimes fastidious about their food. At one time they will eat the crust of bread and refuse the crumbs, and at other times they exactly reverse this order. Occasionally they will eat both, and in these whims they do not always act concurrently. Sometimes they eat the succulent part of bananas, at other times only the skin, and at still others they eat only the thin inner lining of the skin. On many occasions they bite off the points and eat them, while at other times they peel the fruit, break it in two about the

middle, take a bite from each of the freshly-broken ends and throw the rest away. They are both especially fond of uncooked ham and also of roast or ragout of chicken; but they do not relish fried meats, if they can get other kinds; although sometimes they eat fried bacon.

The universal notion that gorillas are vegetarians is, in my opinion, an egregious error. Nearly all of my gorillas have been meat-eaters and I have had abundant evidence in the jungle that it is a general habit. A fact well worthy of notice is that almost every item of vegetable food chosen by the gorilla in a wild state is of a distinctly bitter, acid or pungent taste, and some are even acrid. I know many of the plants that constitute a large part of their diet, and I do not know of one with a sweet flavor and but few neutral ones.

This is my first methodic attempt to change the dietary of the gorilla; and thus far the experiment has been successful. Just what effect, if any, the change may ultimately have on their health and longevity, is difficult to predict, but up to this stage it appears to be salutary.

R. L. GARNER.

Fernan Vaz, French Congo Territory.

LADIES' AND MEMBERS' DAYS.

Members' Day will be observed at the Zoological Park on May 21, 1914. Good music will be provided and refreshments served. Arrangements also have been made to serve tea to the members of the Society on the afternoons of May 28, June 4 and June 11, at the Administration Building in the Zoological Park.

Ladies' Day will be observed on May 14, 1914.

RECEPTION AT THE AQUARIUM.

A reception will be given the members of the Zoological Society at the New York Aquarium at 8:30 o'clock of the evening of May 4, 1914. This is the first of such functions that hereafter will be held annually. Music will be provided and refreshments served. Each ticket will admit three persons; the bearer and two guests. All responses should be forwarded to the Secretary of the Society, 11 Wall Street.

FRANCE AWARDS A MEDAL TO DR. HORNADAY.

An event of recent occurrence in France is of unusual interest to American protectors of birds. On March 28, 1914, there was bestowed upon Dr. W. T. Hornaday, at Paris, a gold medal for international work in the preservation of wild life. In view of the numerous enemies that the protection work of Dr. Hornaday has made for him, both at home and abroad, the action of the two affiliated French societies in making the award forms an agreeable counterpoise.

As given by the Secretary of the French National League for the Protection of Birds, the title of the medal is *"Grande Medaille Hors Classe,"* bearing the effigy of Isidore Geoffroy St. Hilaire. It was awarded jointly by the National Acclimatation Society, which is really the leading Zoological Society of France, and the affiliated French National League for the Protection of Birds, "for international work in the protection of wild life." Of course this "international work" relates to the enactment of our law for the suppression of feather-millinery in this country.

In awarding this medal, the two National Societies named have taken a very bold stand against the feather trade of France and the world at large. Before the award of the medal was decided upon, the two Societies named were approached by the feather dealers, and requested to form a "Committee for the Economic Study of Birds," similar to that which was formed in England by the feather trade. After fully considering the facts and arguments that were presented, the joint Council of the two Societies reported, unanimously, that "the evidence submitted to the Congress of the United States and Parliament of Great Britain, against the continuance of the trade in wild birds' plumage, is reliable and conclusive," and the two Societies firmly declared themselves unwilling to co-operate in any way in the formation of the dilatory Committee of Economic Study that was proposed. The next action was a decision to award the Society's Grand Gold Medal of Honor to Dr. Hornaday.

It was first proposed that the medal should be awarded at the joint annual meeting of the Acclimatation Society and League for the Protection of Birds, to be held on March 29, at the Museum of Natural History, in Paris; and the American Ambassador, Mr. Myron T. Herrick, had promised to attend and receive it.

The President of the Republic, and the Minister of the Colonies who was to take the chair, had engaged to attend, with the Ambassadors of several foreign powers. The plume-traders' syndicate, having heard of this, apprized the Government that if the medal was delivered at the public meeting, "it was to be expected

that the workmen of the plume trade would in some violent manner publicly manifest their disapprobation." The feather trade strenuously objected to the presence of President Poincare at the presentation, even though he is known to be in sympathy with the work of the two Societies in the preservation of the birds of the world. In order to avoid an unpleasant episode, the officers of the two Societies reluctantly decided to alter their program somewhat; but it is reported that "the American Ambassador acted most gallantly in the matter, saying that in any event he would attend the meeting and if any stones were to be thrown he wished to take his share."

The presentation of the medal was made at the American Embassy, on March 29, by a delegation of officers from the two Societies, composed as follows:

Mr. Edmond Perrier, Member of the Institute of France, President of the Acclimatation Society of France.

Mr. Magaud d'Aubusson, President of the League for the Protection of Birds (subsection of Ornithology of the Acclimatation Society).

Mr. A. Chappelier, Secretary of the League.

Mr. Maurice Loyer, General Secretary of the Acclimatation Society.

Mr. Pierre Amedée Pichot, Honorary Member of the Council.

Mr. Ch. Debreuil, Member of the Council.

On receiving the medal, Ambassador Herrick made the following response:

"In awarding an honorary medal of your Society, one of the most distinguished of France, to a citizen of the United States of America, you are honoring the Nation as well as the person upon whom such distinction is conferred, and it affords me special and particular satisfaction to receive your medal on this occasion in behalf of Dr. William T. Hornaday, who greatly regrets that his lectures at Yale University prevents him from being present, so as to receive it personally.

"The fact that this eminent Society has deigned to bestow such an honor in recognition of services rendered to the cause of bird protection throughout the world, is most significant. It indicates that the destruction of wild animals, pursued in all parts of the world, has assumed so grave an aspect that it has attracted the attention of scientists, of statesmen and of society in general.

"In awarding your honorary medal to one of the most ardent champions of your cause in the world, unremittingly engaged in the defense of wild birds and animals in their painful conditions of existence, the Acclimatation Society of France has boldly challenged the persistent demands of fashion, and expressed, in a manner that cannot be misunderstood, its desire to see the slaughter of wild birds for the sake of trade come to an end.

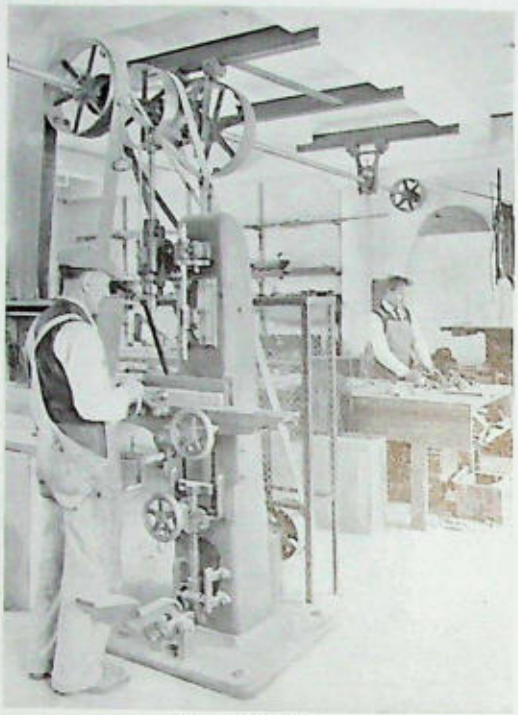
"The American people, having witnessed the brutal destruction of the vast herds of buffaloes and deer, as well as of wild birds, desired that law and order with regard to those matters should prevail in their own country, although it could not be done without strife, and they will know how to fully appreciate the moral courage which has resulted in this act on your part, which will be approved by all those whose judgment is based on a broad-minded and impartial examination into this matter.

"In behalf of Dr. William T. Hornaday, it becomes my pleasant duty to thank you for your appreciation of his services, and to assure you that he will continue to devote his efforts to this noble cause, and persist in his attempts to save from destruction the animals and birds, —so beautiful and useful,—which are now being slaughtered without pity or mercy."

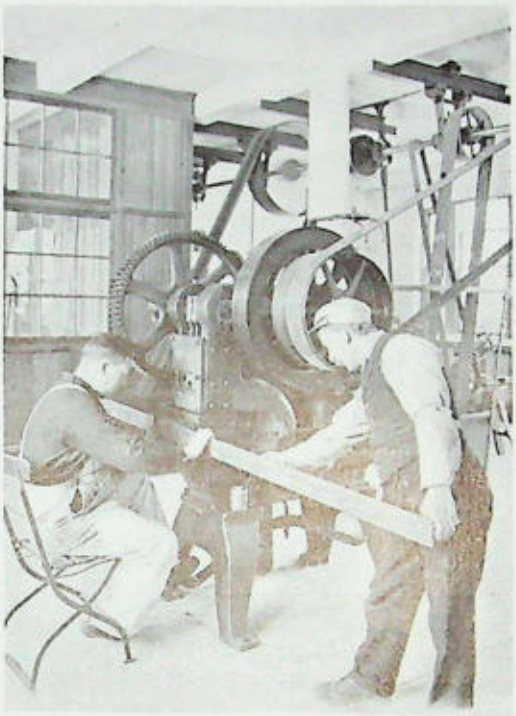
It is well to point out clearly the courage of the leading zoologists of France in making this award, in the face of the feeling in Paris against us on the part of the feather trade. Even when it was privately announced that the medal was to be awarded, there were those who did not believe that it ever would come to pass, because of the probability that the feather trade of Paris would object so strongly that the idea would have to be abandoned. It seems, however, that the zoologists and ornithologists of Paris have quite as much courage and determination as the leaders of the feather trade. Naturally this episode is keenly interesting to all American defenders of birds, and it affords good grounds for the belief that eventually the zoologists of France will bring the French nation up to the highest level in this cause. MADISON GRANT.

A NEW ANGLE IN THE WAR WITH THE FEATHER TRADE.

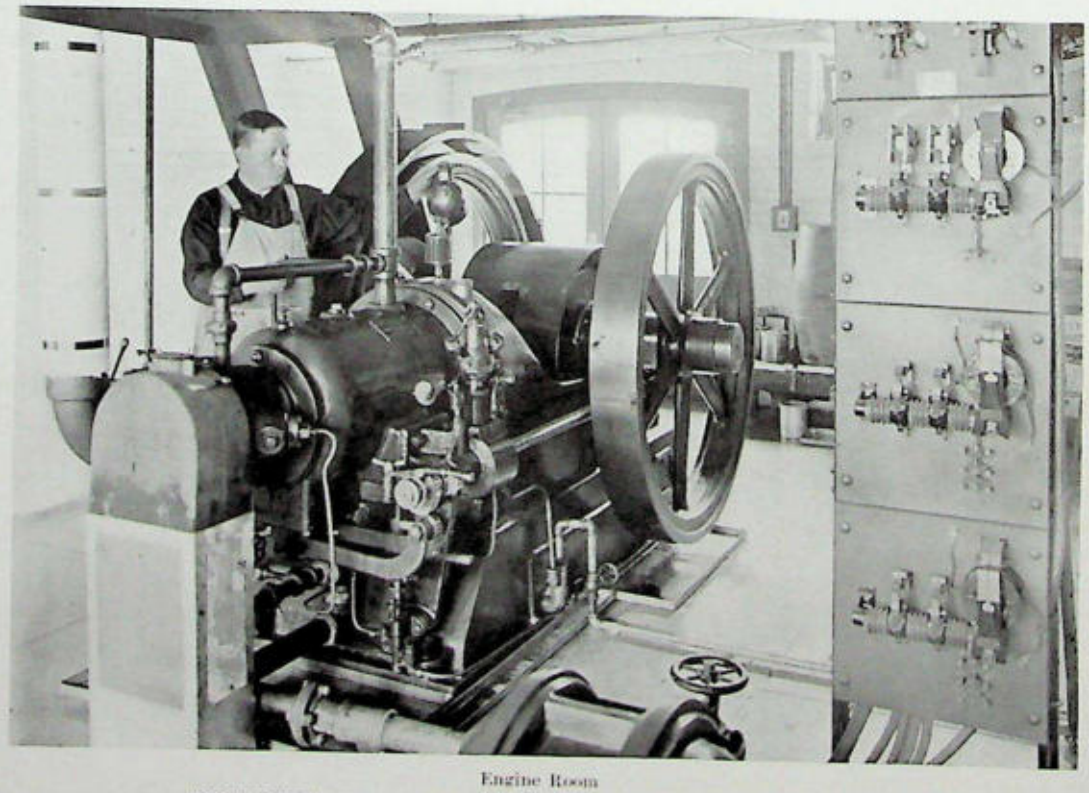
In sharp contrast with the courageous action of the French bird protectionists, there comes to the New York *Times* the following cable news of the struggle that is being made in the British House of Commons to defeat the excel-



Carpenter Shop



Machine Shop



Engine Room

THREE VIEWS IN THE NEW WORK SHOPS IN THE ZOOLOGICAL PARK

lent Hobhouse bill. The last paragraph shows that the "defeat" is not nearly so serious as the first paragraph implies. W. T. H.

"LONDON, April 25.—The Government has been defeated on the Plumage bill, designed on lines similar to the measure enacted in the United States last year, and certain amendments have now been introduced which make it valueless for the purpose originally intended.

"To a certain extent the suffragettes must be held responsible. Mr. Glyn Jones moved an amendment that the expression 'person' should not include any woman over 21 years of age. He said it would be going too far to dictate to an adult woman as to what she should wear in hats.

"The Government, he said, must give women either feathers or votes. The bill, as it stood, would present to suffragettes the easiest road into jail which could possibly be devised. If it became a law many thousands of women would adopt as the emblem of their great organization a cheap foreign feather, and would probably be seen walking with it in their hats round the Houses of Parliament to show their contempt of Parliament.

"Mr. Glyn Jones finally altered his amendment so that the expression 'person' should not include any woman unless engaged in the importing, buying or selling of plumage. This amendment was carried, and women will still be able to wear feathers without the prospect of being fined or imprisoned.

"The provisions of the bill to which the persons engaged in the feather trade so strongly object remain."

CARNEGIE PENSION FUND.

A SHORT time ago Mr. Madison Grant, Chairman of the Executive Committee of the New York Zoological Society, placed before Mr. Andrew Carnegie, the need of the Society for a Pension Fund for the employees of the Zoological Park and the Aquarium. The small salaries paid in those two institutions, which are under the sole control and management of the Zoological Society, render a pension fund imperatively necessary, and there is no expectation that such a fund could ever be supplied by the City. There are one hundred and thirty-nine persons employed at the Zoological Park, and thirty-two at the Aquarium.

As a final reply to the application made to Mr. Carnegie, for a Pension Fund, the following letter was received and laid before the Executive Committee:

Andrew Carnegie,
2 East 91st.

New York, March 17, 1914.

My dear Mr. Grant:

After due consideration I hav decided that the Zoological Society's admirable staff deserv the desired institution, viz., a Pension Fund, and in accordance with your note of March 12, I will provide the $100,000 which you find necessary when you notify me that the organization is ready to receiv and administer this fund.

Let me say that I hav never been more surprised in my life than at the exhibition given us at your recent dinner, which proves that life is everywhere, even down to the gnats, which had to be magnified an hundred fold in order to let us see that the family existed among these midges as completely as in the monster elephant.

Having seen several of the celebrated Zoological Gardens of the old world, our institution in New York seems a giant among pygmies. Several of my foreign friends who hav visited it with me hav reached the same conclusion.

Yours very truly,

(Signed) ANDREW CARNEGIE.

Madison Grant, Esq.,
Chairman, Executive Committee,
New York Zoological Society,
Eleven Wall Street,
New York City.

The employees of the Park and the Aquarium will contribute annually 2 per cent. of their salaries, and any sum that may be lacking in financing the plan now about to be carried into effect, will be made up by the Zoological Society.

The Pension Fund was formally accepted at a meeting of the Executive Committee held March 23, 1914, as follows:

March 23, 1914.

Andrew Carnegie, Esq.,
1093 Fifth Ave., City.

Dear Mr. Carnegie:

I have the honor to notify you that at a meeting of the Executive Committee of the New York Zoological Society held this day, a quorum being present, your very generous proposition of donating to the Society the sum of $100,000 for the purpose of forming a Pension Fund for the benefit of the employees, to be known as the Carnegie Pension Fund, was accepted with the most sincere gratitude and thanks.

It is the intention of the Executive Committee to proceed to organize a Pension Board, which shall have charge of all the details connected with the Pension Funds, its administration and distribution. The principles which will obtain in this respect, are along the lines already presented to you.

I have the honor to remain,

Yours very truly,

MADISON GRANT,
Chairman.

ZOOLOGICAL SOCIETY BULLETIN

Departments:

Mammals
W. T. Hornaday.

Reptiles
Raymond L. Ditmars.

Birds
C. William Beebe,
Lee S. Crandall.

Aquarium
C. H. Townsend.
Raymond C. Osburn.

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Elwin R. Sanborn, Editor

Vol. XVII. No. 3 MAY, 1914

JOHN LAMBERT CADWALADER.

At the meeting of the Executive Committee of the Board of Managers of the Society on April 2, 1914, the death of John Lambert Cadwalader on March 11, 1914, was recorded by the following resolution:

"The Executive Committee of the Board of Managers of the New York Zoological Society desire to express the esteem and honor in which they hold the memory of their late colleague, John Lambert Cadwalader, one of the Founders of the Society and of the New York Zoological Park.

"With his close friend, Philip Schuyler, Mr. Cadwalader stood by the Society in the early days of its formation between 1895-1898 when it had neither plans, friends, nor influence. He was one of the original Board and faithfully gave all the meetings of the Executive Committee between 1895 and 1902 his unrivalled counsel and advice and the prestige of his great reputation at the bar. He carefully examined all the successive legal steps by which secure foundations were established for the future administration of the Society and the Park.

"As in all other causes for the public welfare in our city and country he gave freely of his valuable time and most generously of his fortune. He loved the Park as it developed and was a frequent and delighted visitor. In our meetings we shall always miss his serious, genial and often humorous presence as well as the delightful hospitality of his home.

"This tribute and memorial would be incomplete without a record of his formal service to the Society: An original member of the Board of Managers, elected May 7, 1895; a member of the Executive Committee from May 21, 1895, until January 21, 1902; Second Vice-President from January 21, 1902, until his death; a member of the Board of Managers until his death; elected Associate Founder during 1897; Founder December 14, 1900; Founder in Perpetuity December 6, 1910. During his life he contributed nearly $12,000 to the development of the Park, and on his decease he gave further evidence of his interest in the bequest of $20,000, so that his name will be permanently enrolled as one of the Benefactors of the Society.

"May his example as a citizen and patriot inspire many men of the rising generation to render similar service to the City, the State and the Country."

JOHN HOWARD FORD.

At the meeting of the Executive Committee of the Board of Managers on March 5, 1914, the death of John Howard Ford was recorded by the following resolution:

"Resolved, that the Executive Committee of the Board of Managers of the New York Zoological Society learn with deep regret of the decease on Monday, March 2, 1914, of John Howard Ford, who became a Patron of the Society on January 18, 1898; and desire to place on the minutes a record of their appreciation of his interest and assistance during the early and critical period of the Society's development."

TRICKERY BY THE LONDON FEATHER TRADE.

On March 10, the British Government bill for the exclusion of wild birds' plumage from Great Britain, introduced in Parliament by Postmaster-General Hobhouse, passed its second reading in the House of Commons. After a three hours' debate, the opposition was smothered by the enormous majority of 295 to 15. In view of this vote, and the number of hearings that have been held on the Hobhouse Bill, any fair-minded person would naturally conclude that an overwhelming majority of the people of England desire the passage of the proposed legislation.

Incidentally, the members of the New York Zoological Society will be interested by the fact that the long and strong resolution in favor of the Hobhouse Bill, and appealing to the Zoological Society of London to support it, was most favorably received by the London Society, immediately endorsed by that body, and 5,000 copies of our Memorial were printed and circulated throughout Great Britain in the following form:

THE ROYAL SOCIETY FOR THE PROTECTION OF BIRDS.

23 Queen's Anne's Gate,
London, S. W.

The Director of the New York Zoological Park informed the Hon. Secretary of the Royal Society for the Protection of Birds that at the annual meeting of the Zoological Society of New York held on January 13, 1914, at which upwards of a thousand members were present, it was resolved to cable to the Zoological Society of London the following message:

> "The Zoological Society of New York, having been largely instrumental in securing the passage of our national measure for the protection of the birds of the world, by preventing all importations for purposes of fashion or millinery, hereby extends its greetings to its fellow-members of the Zoological Society of London, and expresses the hope that the Society which represents the other great metropolis of the world, will lend its unanimous support to the Hobhouse Bill, now before Parliament, which is designed to re-inforce the protective measures passed by Congress.
>
> "The effect of the American law has been instantaneous and widespread, and is now receiving unanimous support all over the United States. The very passage and enforcement of the law has created a sentiment for wild life protection in many quarters where it did not exist before. The Millinery trade has adapted itself to the new conditions, and the law is acknowledged to be most beneficial in its results."

The Royal Society for the protection of Birds have heard with great satisfaction that at a meeting of the Zoological Society of London, held on February 4th, 1914, a vote in sympathy with the Government Plumage Bill was passed.
7th February, 1914.

* * * *

But the clearly expressed wishes of the people of England are of no importance to the feather trade,—which now is resorting to the most shameless trickery, in order to kill the Hobhouse Bill by delay, or by amendments. We are in receipt of a list of *forty-two "amendments"* that have been proposed to the Importation of Plumage Bill, up to Tuesday, March 31! In this well-nigh endless series, every form of trickery that can be imagined is attempted, and it is evident that the tools of the feather trade are desperately anxious to defeat the bill at all hazards. Four members of the House of Commons,—Sir Edmund Cornwall and Messrs. Denniss, Hinds and Timothy Davies,—appear as the feather-dealers' quartette, and twenty-four of the proposed amendments are fathered by them. They are feebly assisted by Mr. Glyn-Jones, Mr. Watt, Sir. J. D. Rees, Mr. Dawes and Mr. Rothschild.

Apparently, American legislators have much to learn from our cis-Atlantic cousins of the noble art of obstruction and parliamentary delay. Occasionally some of our members of Congress exhaust themselves by long debate in opposition to measures which they disapprove; but they never yet have made themselves supremely ridiculous before their country by the introduction of an endless chain of silly amendments.

Our advice to the Royal Society for the Protection of Birds,— which is bearing the brunt of the campaign,—is to publicly expose, in the most complete manner, the methods of the feather-dealers' quartette. W. T. H.

NEW MEMBERS.

MARCH 1, 1914, TO MAY 1, 1914.

LIFE MEMBERS.

Davis, Wm. T.
Hagenbeck, Heinrich,
Hagenbeck, Lorenz,
Wendell, Evert Jansen,
Wharton, William P.,
Willets, Elmore A.,

FELLOW.

Stockard, Dr. Charles R.

ANNUAL MEMBERS.

Allen, Rev. Arthur H.,
Anderson, Mrs. J. Scott,
Baird, Allen V.,
Ballard, Sumner,
Booth, Enos S.,
Bopp, John,
Brooks, Miss Bertha G.
Chalmers, Arthur A.,
Campbell, J. W. C.,
Clapp, A. V.,
Clancy, John Evarts,
Conkling, Paul B.,
Conrad, Miss Alicia D.,
Cory, Daniel W.,
Crocker, Robert S.,
Dallett, Frederic A.,
Davis, David T.,
Dery, D. George,
DuBois, Dr. Eugene F.,
Eckart, Edmund,
Edwards, Wm. Seymour,
Embury, Mrs. Jas. W.,
Estabrook, Arthur F.,
Faber, Eberhard,
Fahnestock, Dr. Ernest,
Fahnestock, Mrs. Ernest,
Fraser, Mrs. Geo. C.,
Garrison, Mrs. J. H.,
Greenwood, Joseph R.,
Guggenheimer, Miss E.
Harper, Harry,
Jones, Dr. Israel C.,
Kahn, Felix E.,
Keil, Francis,
Kephart, Rev. Wm. H.,
Lawrence, R. Warren,
Lee, George C.,
Leggett, Warren F.,
McClintock, Gilbert S.,
McCrea, W. S.,
Main, Frank H.,
Paddock, Mrs. Chas. H.,
Perry, Winthrop H.,
Putnam, H. St. Clair,
Quincy, Charles F.,
Robertson, Julius,
Smidt, Thos.,
Schwarzler, Albert J.,
Straight, Willard,
Sutro, Lionel,
Swan, James A.,
Thomas, Seth, E., Jr.,
Tuska, Benjamin,
Uhl, Oswald W.,
Vanderpoel, Ambrose E.,
VanDyke, R. B.,
Vesper, Karl H.,
Walker, Dr. John B.,
Weatherbee, Mrs. E. H.,
Weigle, Charles H.,
Weil, Richard,
Winter, Julius,
Wyckoff, Mrs. Peter B.,



MUSK-OX IN THE ZOOLOGICAL PARK
Two of the musk-ox presented by Mr. Rainey. The female is at the left.

ITEMS OF INTEREST

A New Chimpanzee.—We have been fortunate in obtaining a particularly fine male chimpanzee, and have named this animal "Baldy II." The new arrival is about four years old, and is unusually active and intelligent. He is much inclined to have his own way and exhibits occasional stubborn traits that will be eliminated through sympathetic care and teaching. The species represented is technically known as *Pan chimpanse.*

Life History of Amphibians.—Several interesting life histories are now illustrated in the amphibian series exhibited in the Reptile House. Particularly interesting among these is the life history of the wood frog and that of the leopard frog. Owing to the tardy spring weather, our keepers collected the first frogs' eggs some two weeks later than has been the case in four or five years. We obtained our first lot of eggs on the fourth of April, and these eggs hatched within three days.

Visitors were much interested in noting the development of the little tadpoles as they gradually uncoiled and moved about in the eggs before hatching. After they emerged they looked like tiny leeches clinging to the empty, jelly-like egg-masses. Succeeding days brought marked changes in their form and actions, and these developments were closely followed by a considerable number of school children who regularly came to the Reptile House to study our specimens. The development of this particular frog is rapid, and becomes complete in the early summer. That of the leopard frog is more prolonged, and the development of the bull-frog tadpoles may take as long as two years. Among the life histories prepared for school children this spring will be those of the wood frog, green frog, bull-frog, the common toad, the spade-foot toad, spotted salamander and axolotl.

Tardy Spring.—While really warm spring weather is very tardy in arriving, our observations point to this being the safest type of spring. Abnormally warm days, coming early, tend to excite and open the buds and stimulate the vegetation generally. This is often followed by sharp frosts which sometimes do serious damage. Thus far there is little indication of spring among the trees and shrubs. The only sign of the times comes from the grass, which is becoming very green, and the lively chorus of tree toads from the various pools about the Park. We have transferred a number of these amphibian songsters to the Reptile House, and the cheerful notes of the spring "peepers" help to mitigate our impatience toward the eccentric weather conditions.

Trinidad Whip-Snake.—We have recently received a very beautiful example of the green whip-snake from Trinidad. This reptile is about four feet long, of a satiny leaf-green, and has exceptionally large eyes with a bright golden iris. Tree snakes are difficult to catch because they are both timid and active. The greater number of them are harmless, although some among their number have very small fangs that inject a paralyzing venom and which is used in subduing birds and lizards. One curious feature of the specimen exhibited is the color of its throat. It has a habit of widely opening its mouth when disturbed, and when in this attitude the throat parts are seen to be of a deep purple color. Our specimen is satisfied to confine its diet to small frogs.

A Fine Brazilian Tortoise.—Another recent arrival is an exceptionally large tortoise which comes from the Roosevelt Expedition, in South America. It represents a species known as *Testudo tabulata.* The specimen is remarkable in being far over the average in size, and weighing forty pounds. It is evidently a very old example, as the bright yellow markings which are characteristic on the upper shell of this species are altogether lacking. It is contentedly browsing with others of its kind upon lettuce leaves and bananas.

New Iguanas.—In early April a batch of very large iguanas arrived from Venezuela. Some of the specimens are nearly six feet long, brightly colored and decorated with a row of high standing spines from the neck to the tail. When adults of this species are captured they seldom do well, but we are trying our luck with them owing to the fine facilities offered for sun and exercises in the commodious lizard yards. The new specimens are now exhibited in company with the black Mexican iguana, the banded Central American iguana, and the rhinoceros iguana of Hayti. These big lizards can deal a powerful lash-like blow with the tail and our keepers exercise due care in going among them to distribute the pans of food. Contrary to former assertions the iguanas are not altogether herbivorous. We feed them alternately from pans containing fruit and lettuce, and a mixture composed of fragments of raw beef mixed with beaten eggs.

Another Bear Cub.—Our Russian brown bear that has successfully reared several litters of fine cubs issued from her hibernating quar-

ters on the fourth of April and proudly exhibited a single cub which had made so much noise during the winter and early spring that we had anticipated the appearance of two or three youngsters. The young bear was born on the 19th of January and following the habits of the greater number of bears, the mother remained in the den with it, refusing all food until the latter part of March, when she occasionally appeared to partake of a sparing meal. At birth the bear cub is the most helpless of mammals, being blind and sparsely clad. It is necessary for the mother to remain with it continually as the fragile body would be quickly chilled. From the snarls and grunts that issued from the hibernating den our bear keepers offered various estimates as to the number of cubs in this litter. We were disappointed to find that all of this noise had come from the single specimen, but hope that his unusual lung power will indicate the development of a fine bear. He is a hybrid between the hairy-eared bear *Ursus piscator,* and the Russian brown bear *U. arctos.*

Elephants in Spring.—We have had but two really warm days the present spring and on one of these we were tempted to give the elephants their first exercise this year. Their antics were as humorous as energetic and it is possible that some of the trees in the corrals suffered some damage. The African elephant "Khartoum" dug great holes in his yard, and in these he wallowed until smeared with mud. It has often been noted that this mud bath is of marked benefit to the animals' skin and that if they have suffered any skin trouble during the winter the sores quickly disappear after they have had four or five days' frolic in the outside corrals. R. L. D.

Contemplated Purchases.—The following animals have been ordered of Carl Hagenbeck's Sons: One pair of Blotched Giraffes, from German East Africa; one pair of Siberian Ibex, two and one-half years old; one male Orang Utan, ten years old, and a male Oryx Antelope.

Aquarium Committee.—Dr. Charles R. Stockard of Cornell University Medical School of New York City, has been elected a member of the Aquarium Committee and also a Fellow of the Society.

Expeditions.—Mr. Crandall of the Bird Department of the Zoological Park is now in the jungles of Costa Rica in search of new material for the bird collections of the Park.

Under the auspices of the Society, also, Mr. L. L. Mowbray has been sent to Louisiana to collect large fresh water fishes in the Mississippi River, such as extra large sized catfishes and giant gars. These hardy fishes will be sent to the Aquarium.

Animal Paintings.—The Art Committee of the Society announce that both the large oil painting of a herd of prong-horned antelope ordered about one year ago of Mr. Carl Rungius, and a smaller painting of a snow leopard, ordered of Mr. Charles R. Knight, have been finished, delivered, and accepted. Both of the paintings have been hung in the Administration Building in the Zoological Park.

At a meeting of the Art Committee held on March 30, 1914, Mr. Rungius and Mr. Knight appeared. After careful consideration of a sketch in oils, an order was given Mr. Rungius for a painting of mule deer in the Bad Lands, to be of the same size as the sheep and antelope pictures. From Mr. Knight the Committee ordered a painting of a jaguar, a sketch for which will shortly be submitted to the Art Committee.

Canvasback Ducks on Cayuga Lake.—On March 21, Mr. W. W. Grant sent us the following interesting note regarding the return of the canvasback to Cayuga Lake. There is no other group of birds on which the beneficial effect of protective laws is so quickly apparent as on the ducks and geese. A quotation from Mr. Grant's letter, follows:

"I am happy to be able to report that this spring the canvasback seemed to be quite plentiful, for at this end of the lake as many as 300 were seen at one time.

"The greater scaup ducks were the most plentiful, as many as 500 being seen at one time. Owing to the intense cold this winter, all the duck-feeding grounds were frozen over, and the birds would have fared very badly, had they not been fed by our game-warden, and other public-spirited men."

THE BLACK COBRA.

IN reply to a query of Curator Ditmars concerning the Black Cobra, Mr. Garner, who is stationed in the French Congo in the service of the Society, replied as follows:

"Yes, I know the black cobra with the yellow neck, and have heard many thrillers about its habit of spitting. It is one of the most diabolical members of the order of reptiles. Rev. Mr. Reed, an American missionary for many years in the Congo, recounted to me his experience with this cobra with the yellow neck and if you can find this traveller who now re-



INDIAN SAMBAR DEER
Note the heavy, warm pelage grown by this tropical animal after three years' acclimatization.

sides somewhere in your city, no doubt he can give you some valuable information about that sputtering demon. The universal report of its venomous saliva is that it instantly produces total blindness when it strikes the eyes of the victim. In some cases the eyes are utterly destroyed, but in others the blindness is only temporary, lasting twenty-four to forty-eight hours, during which time the victim suffers great pain.

"The only efficient treatment for it that I have ever heard of is fresh warm milk.

"I could recount many interesting stories that I have heard of this monster and a few of my own experience. It is the only snake in this country that I ran from, and the only one that I know of that will attack without the slightest provocation. A dozen times, perhaps, I have come within a close shave of these fiends when they showed fight, and on one occasion one of them pursued me fifty yards or more. They grow to be at least eight or nine feet long and move with considerable speed. When provoked, or in the act of attacking, they spread the neck after the manner of the cobra de capello and the Egyptian asp, but do not appear to spread the head as the viper does. When the snake poses to spit, it coils, rears its head and more than half of the body straight up in the air, and assumes the form of an old-fashioned candle-stick, only that it turns the head to a horizontal position.

"I have never examined one of them minutely, but I am told that it has two small openings resembling nostrils, one on each side of the head, from which are ejected the sprays of liquid poison, and I am surprised to learn that he can force the spray as far as eight feet, but if I ever learn by experience it will be accidental, for I habitually give this villain the right of way and I go in the other direction."

CHANGES IN PELAGE OF SAMBAR DEER.

IT IS of particular interest to note the thorough acclimatization of the two fine species of Sambar deer exhibited for some years in the Park. The species represented are the Indian Sambar Deer, *Cervus unicolor* and the Malayan or Horse-Tailed Sambar Deer, *C. equinus*. Both are large, showy animals, prolific breeders and little troubled with the gastro-enteric diseases common among cervines. The following notes may be of interest to the reader who is studying the possibilities of stocking game preserves, or breeding deer for sale or study.

Both *C. unicolor* and *equinus* are in the large deer class. An adult male of either species will weigh five hundred and fifty pounds. In temperament both species are more tractable than either the wapiti or red deer, and they closely rival the latter in size and appearance. The bucks of both species are bold and dangerous during the breeding season, but the does of the Sambar deer are usually uniformly docile, even when caring for their young. In build both species are quite similar. The body is stout and vertically broad, with rather short, power-



AXIS DEER IN SUMMER
A very satisfactory tropical deer. Readily endures severe cold.



TROPICAL DEER IN THE SNOW
An acclimatized Sambar that has grown heavy pelage and endures severe winter weather.

ful limbs. The antlers are short and thick. The general build, except for the larger size, rather resembles the North American mule deer.

In 1904, when we first arranged our collection of Asiatic deer, we referred to the Sambar deer as "thinly haired." We presently discovered that a rapid phase of evolution probably would render these animals less susceptible to the vigors of our vacillating weather, and materially change their appearance.

During the first winter the Sambar deer were quartered in a large room of one of our standard deer barns, and the bitter cold of severe nights was tempered by means of a small stove. Care was taken not to raise the temperature above 40° F. or permit it to go below 25° F. During mild sunny days the animals were permitted to run in the yards, but were shut in the house at night. With the spring we noted a marked thickening of the animal's pelage. The hair had become thick enough to entirely cover the creature's naturally oily skin.

With the second winter the herd of these deer was quartered in a tight barn without a fire. All of the animals grew fine coats of hair, and were out on some of the coldest winter days. Their pelage had begun to grow thick and heavy. Two winters had thus sufficed to partially acclimatize these fine, tropical animals, and render them able to endure severe winters without artificial warmth, and with no special provisions different from those of our native deer excepting a closed barn at night. After three years in captivity our Sambar deer grew pelage heavy enough to appear unusually well-clad, even beside the winter coats of our deer of the temperate zone. Several photographs presented here show this rapid evolution in pelage.

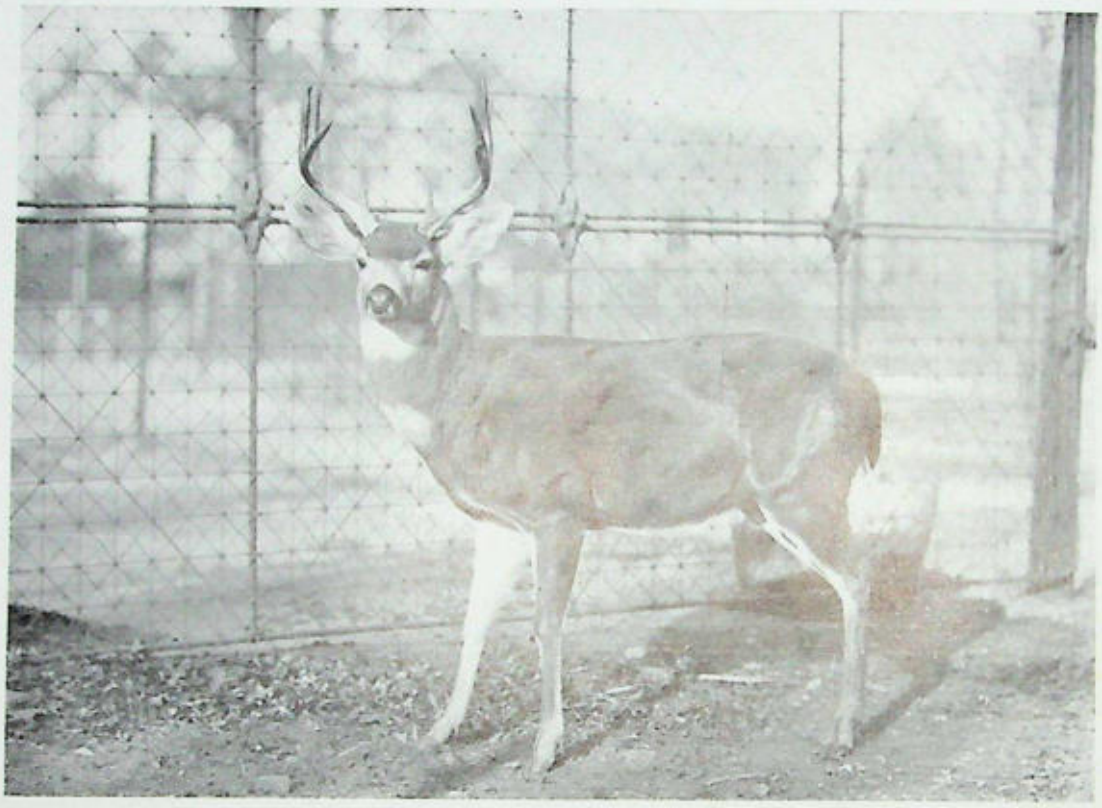
The Axis Deer, with its snow-white spots, is the most beautiful deer in our collection, and one of the most satisfactory. Although its habitat embraces the warmer portions of India, it quickly becomes acclimated, and we believe it



WINTER PELAGE OF THE MULE DEER
Compared with an acclimated Sambar, this deer of the temperate zone is no better clad.



MALAYAN SAMBAR DEER
Showing the thin, oily pelage of the Sambar before this tropical deer becomes acclimated to our severe winter weather.



COLUMBIA BLACK-TAILED DEER IN THE ZOOLOGICAL PARK
To rear these beautiful American deer was one of the most trying problems that the Society has solved. We can boast of four fine specimens, two born in the Park.

will yet be able to live in unheated barns, like the Sambars. With our Axis Deer, however, we constantly maintain a small stove during the winter to moderate the chill, as the greater number of the fawns of this species are born in midwinter. A few years in captivity here has produced a very noticeable thickening in the pelage of this species, but the effect is less marked than with the Sambars, and the present animal is less bold in venturing from its shelter during severe cold waves. R. L. D.

THE MYSTERY OF THE BLUE GOOSE.

By C. William Beebe.
Curator of Birds.

IN the collection of the New York Zoological Park there has been for a year a solitary male Blue Goose. Lately a second specimen, a female, has arrived, and another pair is shortly expected.

While the completion of the life histories of our North American birds will give occupation to many generations of ornithologists, yet so much has been done, and so many facts already recorded that it would seem that the general outline of this work must at present be fairly well filled in. It is thus surprising to learn that the life of one of our geese—that family of birds which never lacks attention, at least from sportsmen—is almost as little known as when Audubon made the error of supposing it to be the young of the Snow Goose. He writes: "The Snow Goose in the gray state of its plumage is very abundant in winter, about the mouths of the Mississippi, as well as on all the muddy and grassy shores of the bays and inlets of the Gulf of Mexico as far as Texas." This probably refers to the bird which we now call the Blue Goose, known to ornithologists by the Greek and the Latin names of *Chen caerulescens.*

About this bird and its life and home there has been and still is a mystery which has never been solved. While one of the rarest of our water-fowl, it has occasionally been shot by gunners, both on the Atlantic and Pacific coasts. In southern Louisiana, however, this bird has

recently been found in winter in great numbers, thus confirming the assertions of Audubon. In the delta of the Father of Waters, flocks of thousands were seen, in fact they were so abundant and hungry that they were denuding whole delta islands of grass as completely as it could be done by a herd of sheep or an army of caterpillars.

Not only do the birds feed upon the green tops and tougher stems of the pasture grasses, but even dig up and devour the roots. Each individual goose scoops out a hole in the mud, uncovering and devouring the roots as it works, and as the geese feed quite close together, these rounded pits soon touch and coalesce, when the birds move on to a new feeding place. They keep more or less in long lines as they feed, reminding one of soldier ants or the famous army worms.

The continued effect of this is to change radically the condition of the land. In some cases the ground is so low that the slight excavations fill at once with water and thus pastures are altered to marshy lands. Where great numbers of the birds have occupied these places as roosts, the pressure of their feet has so reduced the general level that actual lakes are produced, in which henceforth only aquatic plants can find a roothold.

In one locality men with horses and guns were hired to keep on the move all day and try to drive away the geese, but this was not successful and about two thousand acres of pasture lands had to be abandoned to the birds. Elsewhere in the United States, one Blue Goose is the average among every ten thousand other geese shot; here one sees a white Snow Goose to about every two or three score of Blue Geese.

Concentrated as these birds are in this one region, it would be thought that they were in constant danger of extermination, but two causes will prevent this: first their extreme wary nature which keeps them away from traps and beyond shot-gun range, and second, the still more important fact that a good section of their feeding grounds has been acquired as game preserves, where they will be safe forever during their winter sojurn in the south.

Usually where birds are so numerous that they are harmful to man, as, for example, the bobolinks in the rice-fields, we know where they breed extending over a wide area of the continent. But the mystery of the Blue Goose is that we have not the slighest hint of where these thousands go when they rise from their southern island pastures in early spring and fly northward. It is surmised that it may be in Ungava, the great unexplored region lying between Labrador and Hudson Bay. The Esquimau say that in the impenetrable bogs and swamps of this land, guarded by the hosts of black flies and mosquitoes, the Blue Goose makes its home.

This goose is over two feet in length. The head and upper neck are white, while the rest of the body and wings are a beautiful bluish grey or brown. In many ways it is our handsomest wild goose, and while the only one which does any real damage to man's interest, it is at the same time one of the rarest, of whose life history we know nothing. A few have been kept in captivity but no eggs have been laid under such conditions. In Louisana it is known as the Bald or White-headed Goose, *Oie Bleu*, Blue Brant and Blue Snow Goose. Elsewhere it is not well enough known to have received any special name.

BREEDING BROWN PELICANS.

By C. William Beebe,

Curator of Birds.

IT is a great compliment to the conditions under which birds in captivity are kept when such a large and wary species as the Brown Pelican will breed successfully. For many years these birds have played with sticks in the large flying cage, gathering them into tentative heaps and allowing them again to be scattered. Two seasons ago when a severe wind storm had filled the cage with a large quantity of twigs, the birds seemed to receive a correspondingly strong stimulation and went to work with a will, erecting a firm, well-built structure. One stick at a time, however small, was brought in the very tip of their great beaks and with the utmost seriousness added to the nest, tucked in with gentle pokings, sometimes only to be removed and placed elsewhere. A single egg was laid but nothing came of the venture.

This year an abundance of sticks and twigs was supplied as soon as the birds were placed out of doors and nest-building began at once. Two pairs were thus occupied, and near the edge of the water two nests were built. One nest resulted in failure, but upon the single egg of the second pair of Brown Pelicans, patient incubation soon began.

At last the reward came and the first young pelican ever hatched north of Florida broke

through its shell. There are few more ugly things in the world than a young pelican. Lying prone in the nest it appears wholly lifeless and of the color and texture rather of a bit of water-soaked beef than a bird. It seems to have no definite organs or symmetry. It is naked, dirty-gray, with tiny, crooked, worm-like wings and a blind, featureless head. The newly hatched chick is an avian postulate which we must accept but which requires all our faith in Mother Nature—and the pelican. Nevertheless in the little creature are the latent possibilities of a splendid winged creature which can swim upon the water, walk on the land, soar for hours at a time on almost motionless wings high in the heavens, and finally dive into the ocean in pursuit of its prey. Surely the pelican in the course of its development offers the utmost antitheses of helplessness and achievement.

After a fortnight our faith has its reward, for the gray nesting worm has sprouted a garb of grayish-white down; its eyes have opened, and in the somewhat lengthened beak we may even discern the promise of the future capacious pouch. In place of helpless quiescence it moves about, and when chilly pushes beneath the warm breast plumage of the mother, and at times clamors for food. In the last newly-acquired character lies one of the most interesting facts in the life of this species. It truly calls for its food. Not, to be sure, with the pleasant, urging of young chicks, but at least with a decided vocal demand—a rasping croak, so strong that it may be heard many yards away. The far distant ancestors of pelicans undoubtedly had need for voices. They may even have had a song for all we know. And now, to the chick, as long as it requires food, is vouchsafed a voice. When it begins to forage for itself and takes up the serious business of life — that of fishing — silence falls gradually upon it, the croak becomes weaker day by day, and soon the hiss of air rushing through the throat is the only sound it can produce. The only vocal sound that is, for it can clatter its beak vigorously when it strives to frighten an enemy. On Pelican Island I have listened with wonder to the uproar from the throats of scores of young birds, while the parents were leaving and returning, all mutely, dumbly busy with their life work. It is a problem, both interesting to the ornithologist and significant to the philosophical lover of wild things, why the ears of the old pelican remain so keenly attuned to the cries of the young birds, while they themselves are wholly unable to communicate with one another.

To the few naturalists who have enjoyed watching a breeding colony of Brown Pelicans the method of feeding has always attracted attention. Heretofore we have known it in New York from descriptions and photographs, but now we may look forward each season to the opportunity of observing it at first hand in the aviary of the Zoological Society. The mother has fed, fish after fish being engulfed and swallowed whole, and after a time she returns to the nest, her great wings fanning the air, yet allowing her to come to rest so gently that the topmost twigs are hardly disturbed. The young bird renews its imperious clamor, and, clad in its fluffy white down, stands in front of the parent, wildly waving the stumpy, crooked organs which represent wings. The croaks never cease until the mother pelican opens her immense beak, points it downward, and the young bird, eagerly pressing forward, pokes its head into the gaping, leathery pouch. Farther and farther it goes, at last actually stepping upon the rim of the beak. At this point the spectators begin to be nervous and more than once have been on the point of summoning keepers to prevent the horrible tragedy about to be enacted before their eyes. All sympathy is with the young bird as it apparently pushes on to its doom, a quick death in the deep interior of the mother. From this point, however, events proceed too rapidly for intervention. Up and up, and then down goes the young bird, until he has pushed his way beyond the beak and down the neck. Then begin contortions which turn the sympathy of the spectators to the mother, for a terrible contest is apparently taking place between the young bird and its parent, and it seems inevitable that one must emerge from the conflict, mangled and disabled. After a moment of quiet the nestling pelican again appears in the light of day, not only unhurt but replete with a bountiful repast of fish, which stills the croaks until a few hours have passed, when hunger again arouses him to vocal utterance. He steps out of his mother's beak, balances for a moment on very wobbly legs, looks about wholly unconscious of the varying emotions he has aroused in the onlooker, and turning, burrows deeply beneath the living coverlet of feathers which for so many weeks has patiently sheltered him day and night from cold, from rain and the threatened attacks of other birds in the great cage which is his world.



FIVE YEARS AGO, WHEN ELK WERE STARVING

Photographed in Jackson Hole, Wyoming, by S. N. Leek before Congress took hold to save the elk.



ELK HERD TO-DAY IN JACKSON HOLE

They have been fed all winter by the Government and will seek their grazing ground in the hills as soon as the snow goes off. There are 887 elk in this picture and behind the camera are many more. Photographed by S. N. Leek, February, 1914.



ZOOLOGICAL SOCIETY BULLETIN

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WILD PARSNIP IN FLOWER IN BIRD VALLEY.

ZOOLOGICAL SOCIETY BULLETIN

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THE SOCIETY'S EXPEDITION TO COSTA RICA

By LEE S. CRANDALL,
Assistant Curator of Birds.

ON MARCH 21,1914, the writer, accompanied by T. Donald Carter, a student at the Zoological Park, left for Costa Rica, for the purpose of securing living creatures for the collections of the Zoological Society. Six weeks were spent in the field, the total result being more than 300 living specimens, including mammals, birds, reptiles, batrachians, fishes and insects, a great majority of which had not previously been exhibited here.

The round trip was made in the United Fruit Company's steamer "Calamares." The Company's representatives were courteous and interested throughout, and without their co-operation, the success of the expedition would have become a much more difficult matter.

The southward journey was uneventful, Port Limon being reached on March 30. In spite of the combined efforts of the Fruit Company's agent and ourselves, it was found to be quite impossible, except by the consent of high officials, to enter our bulky equipment without the payment of heavy duty and wharfage charges, so that a journey to San Jose, the capital, became imperative.

There is but one first-class train daily from Limon to San Jose, leaving the coast city at 10 A. M. The early part of the ride is along the sea-coast, exhibiting the most luxuriant type of tropical vegetation. Once above Siquirres, however, the train follows the course of the Reventazon River, and as it mounts slowly upward, the scene is one of truly marvelous beauty. The slopes of the Caribbean water-shed are very densely forested, most of the trees being hard-wood. This region is very sparsely inhabited, except in the neighborhood of the larger towns. Several extinct volcanoes are seen—Turrialba, more than 11,000 feet in height, and Irazu, of somewhat lower altitude, on the Caribbean side, and Barba and Poas after the continental divide has been passed. As the higher altitudes are reached, signs of a much more numerous population become evident, and once on the plateau, almost all of the land, with the exception of the higher slopes, is seen to be under cultivation.

San Jose, which is a delightful city, is reached at about 4:30 p. m. Here, after a delay of two or three days, arrangements were finally completed for the free entry of our luggage. Unfortunately, none of the very able local ornithologists was to be found, so, as no reliable advice was to be had, the original plan was adhered to, and Guapiles, a village at the terminus of a branch railroad about 59 miles from Limon, was chosen as a collecting point.

Several days passed before active work could be commenced, as freight is carried two days a week only, and we could do nothing without our apparatus. Comfortable quarters in a passable little "hotel" were secured, and through the kindness of the Fruit Company, we were provided with a shed for the housing of our collection.

Guapiles has an elevation of about 800 feet, being on the northern slope of Turrialba. It once was surrounded by extensive banana plantations, but as the fruit was attacked by a mys-



CITY OF SAN JOSE

terious blight, the trees were removed, and the land turned into pastures. These pastures are exceedingly rough, and the land dotted over with small patches of bush and bits of jungle. As it is not possible for fence posts of dead wood to withstand for long the constant dampness, small poles are set in the ground about two feet apart, and the wire attached to them. The posts at once send out shoots and soon grow into trees of respectable size, forming permanent supports. Thus every field is surrounded by an often dense hedge, which offers a retreat for many birds.

After walking a mile or so, either north or south, one enters the primitive jungle. The trees here are of great size and the undergrowth very dense, so that in many places it is quite impossible to progress without free use of the machete. Bird life in the jungle is fairly abundant, and it is not difficult for the skin collector to secure many specimens. Except in one or two instances, however, it was quite impossible to use our trapping outfit to advantage, and it was only in the more open portions that we could work with any degree of success.

We arrived just at the end of the so-called dry season, although there is almost daily rainfall on the lower slopes at all seasons. The nesting time had just commenced, and the birds were widely scattered. No fruit was ripe, so that the concentration of frugivorous birds on which we had depended, was entirely lacking. However, by dint of much strenuous exertion, we were able to secure a very representative series of specimens.



VOLCANO TURRIALBA
View from the hotel



HOTEL IN SAN JOSE

One of the most interesting and certainly the most showy of the birds, is the Montezuma Giant Cacique (*Gymnostinops montezuma*). This bird, which is of the Oriole family, is nearly two feet in length. It is chocolate brown, the head being darker, with the tail bright yellow. The beak is very long and pointed, black with a red tip. There are bare, bluish patches on the face, and a gular swelling of a pinkish hue, at each side. These birds live in colonies in the highest trees, building pendulous nests often four feet in length.

The Trogons form a group of birds with representatives in both hemispheres, but which, with the possible exception of Cuban species, are practically never seen in collections. We were very fortunate, therefore, to be able to capture and safely transport, a specimen of the Gartered Trogon (*Trogon caligatus*). This species has the upper parts and chest brilliant,

iridescent green, with yellow abdomen, so that altogether it is a most valuable acquisition.

The Sooty Synallaxis (*Synallaxis pudica nigrifumosa*) is the first member of its family (*Furnariidae*), to reach the Zoological Park. The very few individuals of a South American member of the group which have reached Europe have survived for only a very few days, hence our specimen is of experimental as well as purely exhibitive value.

Many of the tanagers are of exceptional beauty. Passerini's Silver-Beak is intense, velvety black, with the back brilliant scarlet; the Costa Rican Green Tanager is grass green, with blue crown, the male having a bright yellow breast; while the Gold-Masked Calliste is a combination of bright blue, green, dense black and golden buff.

Among the finches are Richmond's Sparrows, nearly as large as robins, bright green with gray, brown-striped heads and yellow under wing coverts; a little greenish Siskin, found only in the high mountains of the interior, and tiny Seed-eaters and Grassquits of four species.

The mammals include a fine adult male Red Spider Monkey, Raccoons, Coatis, Murine Opossum and Red-Bellied Squirrels. There are numerous species of frogs and toads, a number of tadpoles, snakes, one a small fer-de-lance, turtles, fishes of several species, and some interesting millipedes of two sorts.

When all packed ready for the journey, our collection was decidedly bulky and when, at the last moment, we were informed that the freight car we had engaged had been left down the line by a forgetful conductor, we were more than nonplussed. After much general excitement, however, a not over-clean stock car was produced, and our boxes were packed forthwith.

The run from Guapiles to Port Limon, which occupied the entire day, was far rougher than anything experienced during the week on the steamer. The car bounced madly from side to side, and it was necessary to lash everything securely to the floor and slatted sides.

Fortunately, there are no export duties or wharfage charges on *animales vivos*, as there are on almost everything else, so it was possible to ship our collection on the next day without undue formality. We were blessed with good weather for most of the homeward trip, and we were so fortunate as to be able to land our specimens, with very little loss, safely in New York.

THE AARD-VARK.

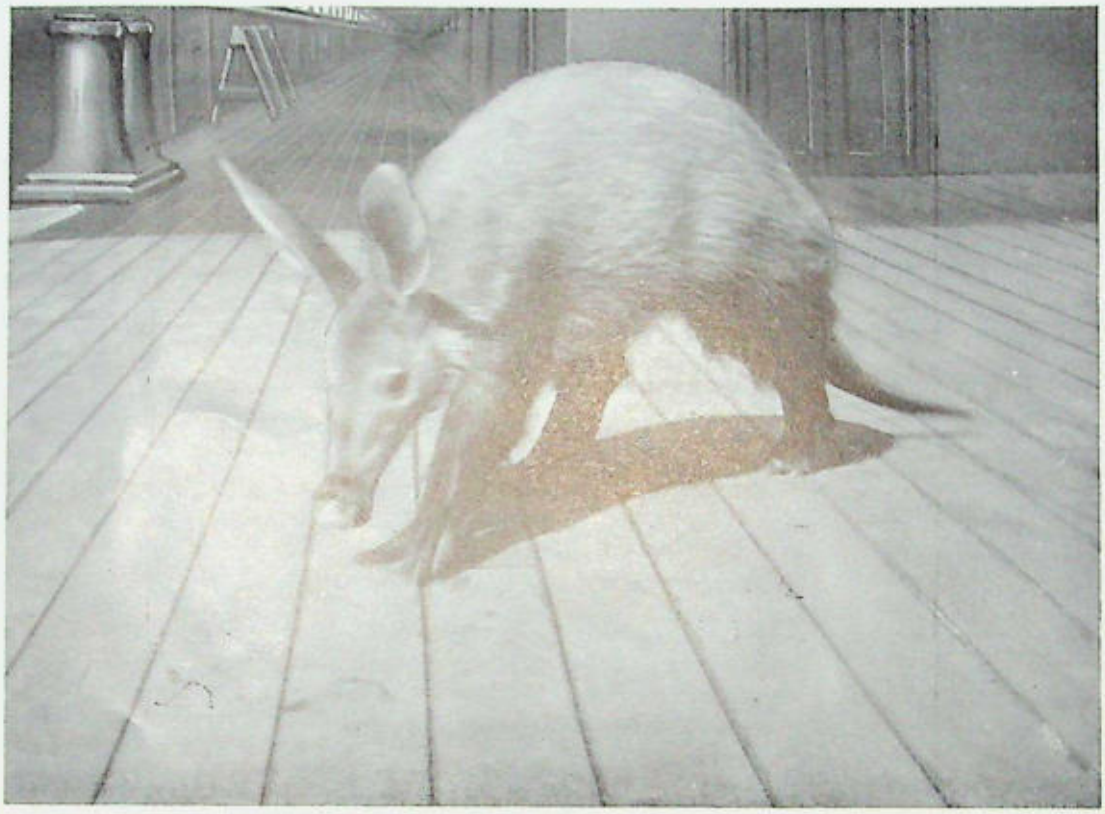
The Society has been almost in possession of an exceptionally rare animal, the Aard-Vark, of Africa, which would have been, perhaps, the first representative of this strange species to reach the United States alive. A fine specimen consigned to us by Carl Hagenbeck left the African coast in thriving condition. We entertained lively anticipations of this coming exhibit, until informed that the animal had died at sea when but two days from this port.

The Aard-Vark is a gigantic representative of that series of the primitive mammalia containing the sloths, anteaters, armadillos and pangolins. Formerly all of these animals were embraced within the order *Edentata*, but the pangolins and Aard-Varks are now considered to represent distinct orders, respectively. The Aard-Varks, three species in number form the order *Tubulidentata*,* their removal from the edentates resulting from the distinctly characteristic formation of the teeth. In full grown specimens there are usually five teeth on each side of both upper and lower jaws, but the total number of teeth developed is from eight to ten in the upper and eight in the lower jaw —the anterior ones falling out as the animal attains maturity. When unworn, these teeth, which are of considerable size, have rounded summits. They are composed of a number of closely packed denticles and are traversed by a series of radiating tubes. Such structure of the teeth is elsewhere unknown in the whole mammalian class.

The specimen destined for the Society represented the Cape Aard-Vark, *Orycteropus capensis*, which inhabits South and South-Eastern Africa. It is a powerful animal, attaining a maximum length of six feet. The general coloration is yellowish brown, with a tinge of red on the back and sides.

The Aard-Varks are strictly nocturnal and live in deep burrows, which are often constructed in the immediate neighborhood of the tall mounds formed by the termites—an ant-like insect. It is upon food like this that the Aard-Vark subsists, and to capture the food in quantities the animal is provided with an exceedingly long, mobile tongue such as is possessed by the ant-eaters of the Edentata. Wherever these animals are numerous a number of half formed holes are seen in the ground and on the sides of the great anthills, which have been commenced and abandoned. The

*Osborn's classification.



CAPE AARD-VARK

Consigned to the Society, but died on shipboard.

animals usually spend the entire day asleep in their burrows, but may occasionally be seen abroad during the very early morning. Their powers of digging are so great that in a few minutes they can bury their large bodies, even when the ground is hard and sun-baked. In digging they work with their fore-feet and throw out huge clods of earth between their hind legs. While shy, and usually making off toward the burrow if disturbed, they are furious fighters when cornered, and even a powerful dog has but a scant chance for life if within range of the fore limbs, with their huge and sharp claws.

Little is known of the breeding habits of these animals beyond the fact that the young are born in May or June, and that there is seldom more than a single offspring at birth. The few captives that have come to Europe have been fed upon chopped raw beef mixed with beaten eggs, which is the standard diet for ant-eaters when on exhibition. The Aard-Vark (earth pig), is a title applied by the Boers.

The first specimen ever brought alive to England was captured in 1869 near Algoa Bay, Natal, and sold for $750. It lived in captivity nearly ten years. From 1900 to 1902, ten specimens were captured and offered for sale, but since that time interest in the capture of the "Earth-Pig" has waned. It is reasonably certain that these animals never will become common in captivity.

The first skin of an Aard-Vark that ever was seen in Europe was taken in 1812. There is now in the South Kensington Museum of London, a mounted skin that dates back to 1814, and it is not strange to hear that it was badly stuffed.

R. L. D.

MR. CHARLES R. MILLER,

Managing editor of the New York *Times*, and life-long friend of animals, both wild and captive, and discriminating judge of wild-animal treatment, is in Europe, enjoying a much-needed vacation.

THE STATUS OF BIRD LIFE IN CONNECTICUT IN OCTOBER, 1912.

By Daniel Carter Beard*

TWENTY years ago in any of the Long Island villages, or the rural districts in Connecticut, the song-birds, particularly the robin and wood-thrushes on Long Island, were so plentiful that in the spring at half-past three in the morning, they always awoke me by the indescribable din they made with their chirping and singing among the trees. Now in similar locations when I am awake between three and four o'clock in the morning at the same time of year, the birds are so few that I can locate each one by its voice without rising from my bed. There will be one robin chirping over to the right and another one to the left maybe, and one or two others in some other location, and seldom, if ever, do I hear a wood-thrush. The decrease in the twenty years must amount to at least eighty per cent. among the robins, and probably as great per cent. among the other birds.

It is not generally known that all of our songbirds are exceedingly local in their habitation. If robins nest in the tree next to my house one year, unless some accident befalls the pair, I can count to a certainty that I will find them nesting within fifty feet of the old nest the following year. I have tested this over and over again with certain birds that I could identify, either by some peculiarity of their plumage or some individual characteristic of their song. For eight successive years, a pair of cat birds nested in a certain lilac bush on my lawn on Long Island. For four consecutive years a certain pair of orioles nested in a certain maple tree at Flushing. So local was this bird in its selection of its nesting site, that at one time three of its nests representing three consecutive years, hung so close together that every breeze caused them to bump against each other. In a tree on the farm of Mr. Harry Lounsbury at the foot of the hill upon which stands Stormfield, the home of the late Mark Twain, a pair of orioles have nested for eighteen consecutive years. Five of these years I have verified myself. In my log cabin in Pike County, Penn., a pair of humming birds have built in the swale near my house, usually selecting the dead lower branches of the pine tree for the location of their tiny nest, for almost twenty consecutive years. I only give these instances to show how local the birds are in their nesting habits, and consequently how easy it is for anyone interested to keep a record of them, and in this way note the gradual but alarmingly rapid decrease of the bird population.

When I bought my farm at Redding, Conn., five years ago, I located all the birds between my house and the depot, a distance of 2¾ miles. In my front yard, or around the house, there were three pair of house wrens. There was also a robin's nest in the eaves of my studio. In each of six large spruce trees there was one or more, and one in the sugar-maple tree. There was one barn-swallow's nest in the horse shed, one in the loft of the wagon shed, and one chimney swift's nest near the barn-swallow's nest in the loft of the wagon shed. There was a large colony of the latter birds in the chimneys of my farm house, and a phoebe bird's nest in the chicken coop.

At the Mark Twain Library corner there was an oriole's nest in the large maple tree, and a blue bird's nest in the hollow of a spruce tree. The chirping sparrows' nests, I have kept no track of. Turning the corner to go to the depot, there was an oriole's in the elm tree, a catbird's nest in the brush at the right. Then we came to the home of a yellow-breasted chat, then to the high bridge with a phoebe bird's nest underneath it; next to a farm with a rose-breasted grosbeak; then to a thicket with an indigo bunting and a humming bird's nest, both of which birds you could find every morning between nine and eleven perched on the telephone wires opposite their respective homes. After this, you passed a pond filled with buttonwood bushes in which the red-winged blackbirds nested; then a bank which the second year was used by a bank-swallow; then the open meadow through which the Saugatuck flows where the bobolink nested; next a robin's nest in a tree to the left-hand side of the road and then three pairs of orioles in the elms near the depot. I omitted one blue-winged warbler in the pasture lot.

The various birds enumerated above were those which occupied positions adjoining the public road, consequently ones which I could observe without leaving my carriage while driving to and from the depot. The orioles next door to my house have transferred their abiding place to one of my spruce trees because their old homestead site in the boughs of a big maple is gone, the tree having died and been cut down. The three families of wrens have met with some accident, and none have come

*Mr. Daniel Carter Beard, the famous artist, author, naturalist and National Boy Scout Commissioner, has closely observed the struggle for existence of the birds of Southern Connecticut, and the decrease of several important species. The careful observations herein recorded are of special value at this time, when the defenders of our migratory birds are endeavoring to save them through the new law.—W. T. H.

this year to take their place, although these three families stayed with me for four years. The barn swallows in the horse shed are still living; but the ones in the loft have not returned, nor the chimney swift in same location. The red squirrels have driven most of the robins away from my fir trees. One season I picked up twenty-one young birds on my lawn killed by those marauding robbers, and every year they destroy most of my tame pigeons. This year we had but two pair of robins breeding in our fir trees.

Last year a pair of blue birds took possession of the fence post. Blue birds are becoming so rare that I took great care not to go near them until they should become thoroughly settled in their home. A little while afterwards I was attracted to the fence-post by the fact that I had missed the call of the blue bird and feared some accident had befallen them. When I went to examine the hole in the fence post, a wren flew out and began to scold me. Upon making an examination I discovered that the male blue bird upon entering the hole had accidentally slipped its leg down a crack in the wood and its foot had prevented it from pulling it through and freeing itself, consequently the poor thing had died there from starvation. But the most astonishing part of this story is, that the wrens had taken possession of the building site and made their nest on top of the body of the blue bird. *This year there has not been a blue bird in the whole distance of two and three-quarter miles to the depot.*

Last year a robin built in a bush at the corner opposite the Mark Twain Library but it did not come back this year. The one on the telephone pole opposite the oriole on the left was on hand, but the cat-bird on the right has disappeared, after four consecutive years building in the same spot. The yellow-breasted chats still occupy their usual location. The phoebe bird under the high bridge is missing; the rose-breasted grosbeak is on hand again this season; the bank swallow which came last year again occupied its hole in the bank; the humming bird after four consecutive years of occupancy of the same spot, is missing; the indigo bunting did not appear this spring. The swamp blackbird, apparently were as plentiful as usual, but I missed several pair of the bobolinks. The robin near the depot did not appear this year, and the three pair of orioles are also missing.

This is the record of a short stretch of time. There are no new birds coming to take the place of the birds that have left, and the record of this little stretch of country road can be duplicated all over the United States. It means that our song-birds are not only rapidly decreasing, but they are on the verge of extermination, and the total extinction of our birds is only a matter of a few years. As Dr. Hornaday says it is time for the American people to wake up, for outside of the sentimental value of birds, there is a money value which will appeal to our money-loving brothers. We have almost reached the condition of the birdless country described by Longfellow, and so far the only efforts to counteract this by acclimatization is the introduction of the pestiferous English sparrow and the squeaking starlings.

Our ancestors had one or more martin boxes on every farm, on the roof of almost every public building in the villages, on the lawns of all the suburban houses, besides which the skulls of old horses, and the slaughtered cattle were preserved on the farm and fastened to the trees and old fence posts for the birds to build in. The old-fashioned barns were alive with the barn swallows, and the eaves encrusted with the mud nests of the cliff swallows. The robins covered the lawns and grass plots; the wrens and blue birds occupied every knot hole, and also made nests in the old hats which the farmers used to nail up under the eaves for that purpose. The whistle of the bob-white could be heard in every field that you passed by; the meadow larks were thick on all the meadows; we had no serious scourge of insects. But now, in spite of the spraying of our trees and our gardens, according to the most careful estimates, the insects cost us the immense sum of $420,000,000 a year.

The following is a summary of five years' observation on a short stretch of country road at Redding, Connecticut:

New arrivals: One golden-winged woodpecker in apple tree in back of my studio; one bank swallow on Dart Meeker's farm.

The following are missing: Three pair of wrens around my studio; one pair of barn swallows; one pair of chimney swifts—from horse-shed; four pair of robins from around the house; two pair of robins at Mark Twain Library corner; one pair of cat-birds, a little beyond toward Redding Station; one pair of indigo birds; one pair of humming birds; one pair of robins near the station; three pair of orioles near the station; one pair of king birds, opposite my farm house; one pair brown thrashers opposite my farm house; one pair of bobolinks in my pasture lot.



MEDAL PRESENTED TO DR. HORNADAY

Obverse and reverse of the medal of the National Acclimatation Society of France.

In the Spring and Fall, thousands of birds are killed by striking the telephone wires. The other day, I picked up four birds, a rail, two olive-back thrushes and one white throated sparrow—all within the space of twenty feet.

Among those that I picked up at different times under the telephone wires, I can recall five or six ruffed grouse, four or five woodcock, one bluejay, one golden shafted woodpecker, and five or six unidentified birds. These were small birds which were beheaded by attempting to fly through the network of the wires. There were also several varieties of thrushes, various kinds of sparrows or finches, a Wilson thrush, all of which were accidental finds.

The telephone wires being along the sides of the road, when the birds strike them, they fall into the weeds and underbrush where they are concealed from view, but in front of my own house, Mrs. Beard tells me that she can often hear them strike the wires and sometimes see them do it when she is sitting at the window sewing.

Redding, Conn., October 14, 1912.

OUR NATIVE HUMMINGBIRDS.

There are certain groups of native birds which do not thrive in captivity and are always liberated when brought to the Park by well-meaning friends. Among these are kingfishers, nighthawks and whippoorwills and until very recently the Rubythroated Hummingbird was included in their number. On May 20, 1913, an Italian laborer appeared at the Park with a feathered mite, safely enclosed in a very dirty milk bottle. On inverting the bottle, the little creature fell out and proved to be a female Ruby-throat. She was in very wretched condition and quite exhausted from constant fluttering against the bottle. Without the slightest hope of being able to revive her, liquid food, which forms the diet of the Sun-birds, was placed near and the hummer's beak dipped in it. She supped the sweet fluid eagerly and seemed much refreshed. Still stiff and numb, she was placed on a shelf in the sun and about ten minutes later was buzzing about the room. After some difficulty the tiny bird was recaptured and placed in a large cage covered with wire mosquito net, once utilized for hatching moths from cocoons. This proved an ideal home for the hummingbird, which at this time is in as perfect condition as if she were at full liberty.

Hummingbirds have been taken to England from South America on several occasions, but have never survived longer than a few weeks. The Ruby-throat is one of the smallest of the hummingbirds and if it survives for a reasonably long period, a wonderful new field will be opened to us, for tropical America abounds with the most gorgeous species of hummingbirds, many of them much larger than our own and therefore apt to be more long-lived in captivity.

L. S. C.

During the severe electric storm of the night of June 25, a very fine female Grant zebra, only two weeks in the Park from East Africa, dashed in fright against her range fence and broke her neck.

ZOOLOGICAL SOCIETY BULLETIN

Departments:

Mammals
W. T. Hornaday.

Reptiles
Raymond L. Ditmars.

Birds
C. William Beebe.
Lee S. Crandall.

Aquarium
C. H. Townsend.
Raymond C. Osburn.

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Elwin R. Sanborn, Editor

Vol. XVII, No. 4 JULY, 1914.

ENFORCEMENT OF THE MIGRATORY BIRD LAW.

In a short time the enemies of the migratory bird law will, with great glee, announce once more that the law is "unconstitutional." This time the statement will have a little more to rest upon than the soap-box decisions of learned spring-shooters of wild fowl who never even saw the national constitution.

In eastern Arkansas at Jonesboro, on May 27, in the United States District Court, the case of the United States against Harvey C. Schauver, for a violation of the Federal migratory bird law, was heard by Judge Jacob Trieber, who decided that "the law is unconstitional." Of course the United States will carry the case up until it finally reaches the United States Supreme Court, where, with extra expedition, a decision may be expected in about eighteen months.

The first decision on the status of the migratory law was that rendered in South Dakota on April 18, 1914, by Judge J. D. Elliott of the Federal Court, who decided, in the case of A. M. Shaw, that the law is constitutional. Mr. Shaw pleaded guilty, and was fined $100, which was paid.

The friends of birds need feel no alarm over this incident, nor anything more serious than mild interest. Unless the United States Supreme Court deliberately elects to pull down a full score of laws that the representatives of the American people have enacted in Congress for the greatest good of the greatest number, the federal migratory bird law will stand. The side of the People and the Birds will be taken care of, if need be, by a hundred able lawyers, who are fully convinced that the law *is* constitutional, and that its stability can be demonstrated to the satisfaction of any open and logical legal mind.

In addition to the score or more New York and Washington lawyers who have offered their services to this cause, some of whom already have prepared extended briefs, Mr. Frederic R. Coudert, one of the most distinguished members of the American bar, has volunteered his service on the side of the birds,—an offer which undoubtedly will be accepted. The United States Department of Justice, headed by Attorney-General McReynolds, can confidently be trusted to conduct the People's fight for the birds with all the legal acumen and resources of that Department.

The decision of Judge Trieber in the Eastern District Court of Arkansas will not in the least affect the enforcement of the national migratory bird law in other States, nor even in other districts. In the forty-seven other States of our country the migratory bird law will be rigidly enforced, and those who violate it will be brought to book and punished.

Meanwhile, the negotiations for the international treaty are going right on, just as rapidly and satisfactorily as is possible in such a matter. The Canadians realize that in protecting the migratory birds we are doing our best to give them a square deal. In due time the treaty will be signed, and presented to the United States Senate for ratification; and when that is done, we believe that the Senate will ratify it. The resolute action of the Senate, 45 to 17, restoring the House appropriation of $50,000 for the enforcement of the migratory bird law, *by two yea-and-nay votes*, shows once more that the United States Senate is an impregnable Gibralter of wild life protection, and even foes within are powerless to turn it over to the enemy! W. T. H.

New York, June 1, 1914.

ROLL OF HONOR.

The following are the Senators by whose votes, May 12, 1914, the Federal Migratory Bird Law was saved. Many other friends of the measure were either paired or absent:

James H. Brady, Idaho.
Henry F. Ashurst, Arizona.
Frank B. Brandegee, Connecticut.
Joseph L. Bristow, Kansas.
Edwin C. Burleigh, Maine.
Thomas E. Burton, Ohio.
George E. Chamberlain, Oregon.
Moses E. Clapp, Minnesota.
Clarence D. Clark, Wyoming.
LeBaron B. Colt, Rhode Island.

Albert B. Cummins, Iowa.
William P. Dillingham, Vermont.
Henry A. duPont, Delaware.
Jacob H. Gallinger, New Hampshire.
Asle J. Gronna, North Dakota.
Gilbert M. Hitchcock, Nebraska.
Henry F. Hollis, New Hampshire.
William Hughes, New Jersey.
Charles F. Johnson, Maine.
Wesley L. Jones, Washington.
William S. Kenyon, Iowa.
Robert M. La Follette, Wisconsin.
Harry Lane, Oregon.
Mr. Lee, Maryland.
Porter J. McCumber, North Dakota.
George P. McLean, Connecticut.
James F. Martine, New Jersey.
George W. Norris, Nebraska.
George T. Oliver, Pennsylvania.
Robert L. Owen, Oklahoma.
Carroll S. Page, Vermont.
George C. Perkins, California.
Miles Poindexter, Washington.
Morris Sheppard, Texas.
Lawrence Y. Sherman, Illinois.
Benjamin F. Shively, Indiana.
Marcus A. Smith, Arizona.
Reed Smoot, Utah.
Thomas Sterling, South Dakota.
William H. Thompson, Kansas.
John R. Thornton, Louisiana.
Charles E. Townsend, Michigan.
John W. Weeks, Massachusetts.
John D. Works, California.
John S. Williams, Mississippi.

THE PLUME DEALERS OF PARIS.

Our European cable news has informed us that an international congress of plume dealers is now closing in Paris. It is stated that the congress has declared that its members are very solicitous about two things: the protection of birds and the repeal of the law of the United States against the importation of wild birds' plumage for millinery purposes. Finally (June 11) action was taken calling for an international conference for the protection of the birds beneficial to agriculture.

The feather millinery trade of Europe sees the handwriting on the wall. Its state of fear and panic is quite natural and understandable. The conscience of the world is awakening to the crime and disgrace of wild-bird slaughter for greed and vanity, and the universal end of the hateful traffic is fast approaching.

Very soon the British Parliament will pass the Hobhouse bill (a Government measure) by a large majority, and that will be another crushing blow to the feather millinery trade of the Continent. In Germany and France the trade is fighting desperately against the inevitable, but the end is already fixed and certain. The disgrace of nations cannot much longer endure.

The feather dealers have resoluted for the repeal of our law, but they can just as easily lift themselves over the Eiffel Tower by their own shoelaces as they can induce the Congress of the United States to repeal its law against feather millinery. The idea is so absurd it is not even amusing.

The proposal for an international congress to protect the birds useful to agriculture is interesting and commendable, even though conceived in a spirit of cheap hypocrisy. There is one nation, however, that will not be represented in that congress, unless it be to give advice to the erring ones. That nation is the United States of America, now the very foremost of all nations in the practical protection of its birds that are beneficial to agriculture, its game birds and the birds of the world at large against the plume dealers at large.

To the American people the proposed congress will be of academic interest only, for we have set our house in order. W. T. H.

New York, June 12, 1914.

A HUGE GAME SANCTUARY.

Emperor Nicholas has now under consideration an elaborate project drawn up for him by M. Kasso, the Russian Minister of Education, for the creation of a huge sanctuary for game on the lines of the Yellowstone Park in the United States. At the instance of the Czar, the Minister secured all the data available relating to the Yellowstone Park preserve and had two or three emissaries cross the Atlantic for the purpose, embodying the information thus obtained in a report to the monarch.

It is proposed to devote some 900,000 acres of State forests in the Province of Kuban, in the Caucasus, to this object. There the animals will be allowed to run absolutely wild, and no shooting or trapping of any kind will be permitted. The building of towns and villages there, as well as operations, will be strictly prohibited, and all the now existing houses and cottages in the district will be removed, and their occupants expropriated. It is hoped by this means to not only preserve, but also to multiply the rarer kinds of game, such as the aurochs, or European bison; the ibex, etc., which are now threatened with extinction.

—*New York Evening Sun.*



DISORDER AT THE FLYING CAGE

This picture shows how disorderly persons occupy park benches and slyly throw rubbish behind them.



ABUSE OF PRIVILEGE TO EAT HOME-MADE LUNCHEONS AT THE PAVILION NEAR THE BEAR DENS.

Could swine have done any worse?



GREAT-BILLED RHEA NESTING
The male bird is on the nest incubating the eggs.

ZOOLOGICAL PARK NOTES.

Nesting birds.—In spite of the late spring, breeding operations in the bird collection are well under way. Among the waterfowl, Canada geese, and wood and mallard ducks have hatched numerous broods, while the cereopsis geese are expected to hatch their annual family very shortly. In the Flying Cage, brown pelicans and white ibises are incubating. For the first time in several years, snowy egrets are nesting, and we are keenly anxious concerning the result. A pair of laughing gulls have scooped a little hollow in the shadow of a towering pelican's nest, and are incubating two eggs. An old cocoi heron, which has passed the last five summers in the Flying Cage, has appointed himself their guardian, and drives off any over-inquisitive inmates.

In the breeding cages, white-winged, Chinese turtle, Australian crested and pea doves, gray-breasted parrakeets and various smaller birds, are nesting, while in the large bird house, black-cheeked love-birds are adding constantly to their already numerous progeny.

By far the most interesting event of the season is the nesting of a pair of great-billed rheas. During the latter part of May, the birds commenced to show signs of breeding, and late in the month the female deposited an egg on the bare ground. Keeper Snyder scooped out a suitable depression and placed the egg on a lining of dried grass. The male bird, who attends to all of the duties of incubation, at once took charge. At present, the nest contains five eggs, assiduously cared for by the prospective father. The female, seeming to feel that she has more than done her share by producing the eggs, takes no further interest in the nest or its contents.

Barrow Bustards.—The bustards as a group are among the most intersting and uncommon birds to be seen in Zoological Gardens. Although generally classed with the shore birds, they are certainly a very ancient family, and their relationships are not perfectly clear.

No member of the group is common in collections, as all of the species appear to be delicate and short lived, and morever, they are very seldom to be obtained. The bird most commonly seen is the great bustard of southern Europe, of which a remarkably fine female has lived in the collection of the Zoological Society since October 5, 1912.

Aside from the great bustard, all of the other species are very rare indeed and so seldom are they to be seen in living collections that the acquisition of any one of them becomes a noteworthy event. It gave us much pleasure, therefore, to receive from Germany, on September 29, 1913, two pairs of the beautiful little



A STRANGE PET
A boat-billed heron that became very tame and fond of his keeper.

Barrow Bustard (*Trachelotis barrovii*). This diminutive bird is hardly one-half so large as the great bustard. Both sexes are sandy in general coloration, but the male is diversified by black crest and throat, and slaty face, chest and abdomen. It is a native of South Africa, where, with several congeners, it is known as knorhaan. It is found on the open veldts, and like all bustards, it is very difficult to approach.

In captivity, although not especially wild, they are very timid and panicky, and easily startled into dashing against the wire of their enclosure, with risk of serious injury to the curiously brittle bones of legs and wings. All are now in the best of health, and form a happy family with the great bustard and ocellated turkey, which share their roomy corral.

Skua Gulls.—Most of the gulls are to some extent carnivorous and not to be trusted when young or weak creatures are within reach of their powerful beaks. In no group, however, is this hawk-like propensity so well developed as in the Skuas (*Megalestris*). Four species are recognized, all plain brownish in color, one hailing from the northern hemisphere, the three others from the Antaretic.

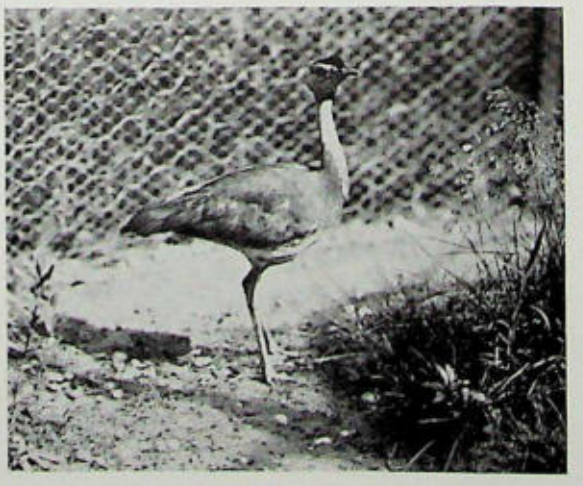
In its gentler moods, when food is abundant, the Skua contents itself with dashing fiercely at industrious gulls of more mild-mannered species, so startling them that they disgorge their latest meal, which the thief catches before it reaches the ground. This disgorging is a habit which is widely spread among fish- and meat-eating birds, and captive specimens will always regurgitate their food if unduly disturbed.

During the nesting season, however, or when food is scarce, the rapacious nature of the bird asserts itself, and it becomes worse than any hawk. Young birds of ground-nesting species, small mammals, and even adult birds of fairly powerful species, are levied on to furnish provender for the ravenous Skuas.

The Society's collection now includes two species of Skuas—two individuals of the Chilian form (*Megalestris chilensis*) brought from Europe in 1912 by the writer, and one northern Skua (*M. skua*), secured a little later from a German dealer. The three birds agree well enough among themselves, but woe betide the unfortunate duck or night heron that settles in their paddock.

Emu Colony.—Although the yak shelter was not quite completed, we could not ignore an opportunity this spring to acquire four fine young emus as occupants of one of its spacious corrals. These birds, with our old pair, have been placed together in the northeastern enclosure. They have settled down amicably, and if we succeed in acclimatizing them, as we hope to be able to do, they will make an interesting group. L. S. C.

Reptiles from Costa Rica.—Mr. Lee S. Crandall, Assistant Curator of Birds, has recently returned from a collecting expedition in Costa Rica, where he was successful in gathering a large number of interesting birds and amphibians. Mr. Crandall also brought with him a series of small mammals and reptiles. Among the particularly interesting amphibians collected by him were some small toads of the Genus *Dendrobates*. These creatures climb about on damp logs or over the leaves of low vegetation. They are remarkable in their brilliant coloration and might appropriately be called the



BARROW BUSTARD
A very rare bird in captivity.



GROUND HORNBILLS
Bizarre, indeed, as Dr. Hornaday exclaimed upon seeing the picture.

Harlequin Toads. One species represented is bright vermillion with bright blue limbs. Another is marbled with green and black. All are small and look much like the enameled objects that are prepared to be attached to jewelry. This is possibly the first time that creatures of these species have ever been exhibited alive. There are several frogs in Mr. Crandall's collection that so far have defied identification. These may prove to be species that are new to science.

New Anaconda.—We have received from Mr. R. R. Mole, at Port of Spain, Trinidad, B. W. I., an exceptionally large and fine anaconda. This is the great water boa of the American tropics. Our specimen is about seventeen feet long. Of late we have heard a number of sensational tales about anacondas that measured forty to fifty feet in length and have communicated with Mr. Mole about the possibility of the existence of such monsters. He writes us that the largest anaconda that he has ever observed in his collecting trips was about twenty feet in length. He very much doubts that this species of snake grows much larger. The largest anaconda ever exhibited at the Park was nineteen feet long and became the mother of seventy-five young, showing this specimen to be quite mature.

Our Walrus.—The Atlantic walrus on exhibition here for the past four years has now attained a weight of over 500 pounds. Upon his arrival this animal weighed 149 pounds. This is possibly the most expensive animal that we have on exhibition. Figuring the cost of this creature's feed for a day—forty pounds of clam-meat—the labor of preparing the feed, the frequent labor of cleaning its tank and sea salt which is added to the water to produce an ocean density, the cost of keeping the walrus is equivalent to that of feeding two large elephants. During the past few months, the tusks of the walrus have been rapidly growing and are now about four inches long. Previously it was possible to maintain a partition fence between the walrus and the sea lions that consisted of chain mesh. Now the animal has shown a frequent habit of sticking its tusks in the netting and tearing it down. It has made several excursions into the sea lions' enclosure



AMERICAN BALD EAGLE
Drying his feathers after a hard rain.

with results of considerable excitement, although no harm has been done. We have now decided that the animal's growth warrants a partition of heavy bars.

Recent Arrivals.—A consignment of valuable and showy animals has arrived from Carl Hagenbeck at Hamburg. These consist of a Blotched Giraffe, three Grant Zebras and a magnificent male specimen of the Gelada Baboon, the latter animal from Abyssinia. The giraffe had a particularly hard time on its long trip from Africa. When a short distance from the African coast the ship entered a severe storm and pitched so badly that the giraffe was thrown against the side of the crate and sustained a laceration on the shoulder, which was about fourteen inches long. It was otherwise bruised and cut about the limbs. When the animal arrived at Hamburg it was not permitted to land, owing to quarantine restrictions. Its crate was hoisted from the steamer and placed upon a scow where it was kept several weeks under observation, then shipped to America, *via* Baltimore, owing to quarantine restrictions here. Upon arrival in this country the Department of Agriculture granted the Society permission to ship the animal to New York and quarantine it in the Park. The crate was too large to pass under railroad bridges so the animal was again transferred to a steamer of the New York & Baltimore Transportation Company which took two days to reach this port. Once in New York the giraffe was loaded upon a large stock truck and hauled to the Park. When turned into its stall it looked much dilapidated, but is rapidly recovering in health and spirits and should make a fine exhibition animal.

Another Gorilla.—Mr. Richard L. Garner, who was commissioned by the Society to undertake a collecting trip in Africa in order to obtain gorillas, will soon return to the United States bringing with him a fine female specimen of this much sought animal. Mr. Garner will arrive in New York the latter part of August. But two gorillas have ever arrived in the United States alive. Neither lived more than a month's time. The difficulty has been in inducing captive gorillas to take the food we give our other anthropoids. Mr. Garner has



CALIFORNIA CONDOR
A difficult subject to photograph

decided to remedy this difficulty with the present specimen by keeping her in Africa and inducing her to feed upon the products we shall offer here. This involved a long and tedious process of initiation, but this gorilla has been induced to eat bread and various other cereals. She is now considered properly trained to leave her native land.

It is gratifying to note that the gibbon, which has been of so much interest at the Primate House, continues in a thriving condition. These animals are delicate and difficult to keep in good health, but the specimen at hand is an exceptionally active one and the great amount of exercise in which it indulges daily accounts for its continued thriving condition.

A Huge Orang.—A new arrival, possibly the most spectacular animal in the Park, is the huge Orang-Utan recently received from Hagenbeck. This is probably the largest anthropoid that has ever been exhibited alive in this country. We estimate the weight of "Ali" to be about 180 pounds. He is fairly good tempered, but cannot be trusted and no two men could overpower him if he decided to attack them. We treat this superb creature as a dangerous animal and the keepers are not permitted to enter his cage. "Ali" receives the same rations as a man, eating three hearty meals a day and enjoying a dinner of soup, meat, vegetables, bread and several glasses of milk. His table manners are not of the best, but we have decided that he is too strong and willful to be taught to eat in the dignified fashion of the smaller anthropoids on exhibition. R. L. D.

Ground Hornbills.—The hornbills, taken collectively, are arboreal birds, seeking the bulk of their food among the tree tops. When they do descend to the ground, they are clumsy and quite evidently out of place, progressing with awkward hops.

In Africa, however, are found two species of very large birds, known as the Ground Hornbills, (*Bucorax*), which are almost entirely terrestrial in habit. Their legs are long and the feet flat and strongly developed, an evident adaptation to life on the ground. They walk instead of hopping, and are able to run very swiftly, seldom taking wing unless very closely pressed.



LELWEL HARTEBEEST

These birds are usually found in open country, small parties of six or more keeping together. Their food consists of small creatures of all kinds, as well as fruit. They are said to be skilful snake-killers, the entire flock uniting in the attack.

The Ground Hornbills are not common in captivity, being, as a rule, rather short-lived. Two fine specimens, representing both the North and South African forms, reached the Zoological Park on April 1, 1914, and in June three additional examples of the northern species were secured. They are showy birds, the great black beaks and swollen blue and scarlet gular pouches giving them a very grotesque appearance. L. S. C.

Reception at Aquarium.—The first of a series of annual receptions to members was held at the Aquarium on Monday evening, May 4. An attendance of about six hundred was noted, including thirteen members of the Board of Managers. Ladies from the Ladies Auxiliary acted as a Reception Committee. Motion pictures were shown of the porpoise expedition, and of elephant seals on Guadalupe Island. Music and refreshments were furnished.

Ladies' Day at the Park.—The Ladies' Auxiliary held a reception at the Park on Thursday, May 14. Band music was furnished and refreshments were served.

Members' Day at the Park.—On Thursday, May 21, a reception, with music and refreshments, was tendered to members in the Administration Building. Arrangements were also made to serve tea to members in this building, on Thursday afternoons, May 29, June 4 and 11, but the attendance on the latter days was too small to justify their continuance. Hereafter this reception will be held on the first Thursday in June.

Spring Meetings.—The spring meeting of the Board of Managers was held in the Administration Building in the Zoological Park on Thursday, May 21, 1914. General reports were received from the Executive Committee, the Treasurer and the Directors of the Park and the Aquarium. It was also decided to hold this meeting hereafter on the first Thursday

of June at 2:30 o'clock P. M., and that it be preceded by luncheon at the Park.

Vice-President.—At the Spring Meeting of the Board of Managers, May 21, 1914, Mr. Madison Grant was unanimously elected Vice-President to fill the vacancy caused by the death of Mr. John L. Cadwalader.

Cadwalader Animal Fund.—Under the Will of the late John L. Cadwalader a bequest of $20,000 has been left to the Society, to be held as a fund, the income of which shall be used for the purchase of animals for the Park. As soon as this money is received it will be credited to an account to be known as the "Cadwalader Animal Fund," and the income thereof will be annually devoted to the purchase of animals.

Carnegie Pension Fund.—A check for $100,000, has been received from Mr. Carnegie. The plan for our pension system has been submitted to an actuary, and a Pension Board appointed, consisting of the following:

George C. Clark, Chairman; Lewis R. Morris, H. Casimir deRham, William B. Osgood Field, Percy R. Pyne, Treasurer, representing the Board of Managers; H. R. Mitchell, Raymond L. Ditmars, H. W. Merkel, representing the employees at the Zoological Park, and Raymond S. Osburn, representing the employees at the Aquarium.

The plan provides on a moderate scale for pensions for the employees of the Society at both the Park and Aquarium, and is based on a contribution of 2 per cent. of their salaries from employees, and a contribution of 4 per cent. of salaries from the Society. There is an annual balance of over $4,000 which will have to be charged against the General Income Account, and will render an increase in the endowment fund during 1914, an absolute necessity. With this end in view an effort will be made by the Executive Committee in the fall to increase the total endowment of the Society from $320,000 to $500,000.

ELK OF THE YELLOWSTONE PARK; CENSUS OF THE NORTHERN HERD.

Between April 11 and May 2, 1914, under the direction of the superintendent of the Yellowstone Park, a careful census was taken of the elk in the so-called "northern herd" of the Park. The result of the enumeration was as follows:

Total number counted inside of the Park along the northern border	32,209
Number observed outside of the Park, in the Gallatin National Forest, belonging to Park herd	3,000
Total number actually belonging to the Park herd	35,209
Total number shipped from the Park during the past winter	99
	35,308
Total number in Park herd as reported May 8, 1913	32,229
Increase in the herd during the year	3,079

Numbers given are from actual count only. The men engaged are fairly certain that they missed one herd of about 1,500, and another of about 600, passing them during a storm. They reported only the actual count.

Only 30 dead elk were found. Elk and other game was never known to be in better condition, with so few dead ones in the spring.

Blacktailed deer show a particularly satisfactory gain, 892 having been counted while counting elk—more than have been known before for several years.

Yellowstone Park, Wyo., May 4, 1914.

The Case of Gunda.—As we go to press, the fate of Gunda, our large Indian elephant, is being pressed toward the point of deadly action, by the New York *Times* and persons who have been aroused by that newspaper. It is quite possible that popular clamor, based on insufficient information, will eventually cause Gunda to be shot to death long before such a fate becomes really necessary, or justifiable.

NEW MEMBERS.

MAY 1, 1914, TO JULY 1, 1914

LIFE MEMBERS.

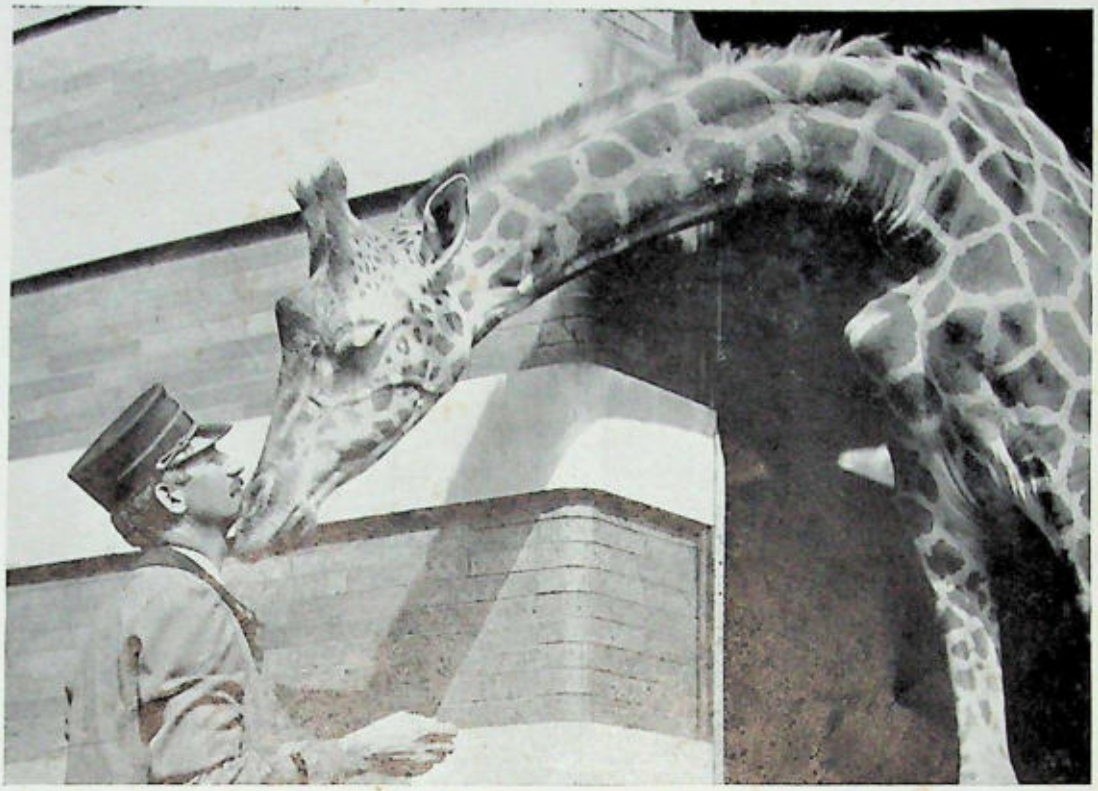
Havemeyer, T. A.	Pierrepont, Seth Low
Phelps, Capt. John J.	Thayer, Mrs. E. R.

ANNUAL MEMBERS.

Bissell, Clinton T.	Kurzman, Charles C.
Bolton, William H.	Kuttroff, Frederick
Brede, John	Marshall, A. W. W.
Brinckerhoff, A. G.	Miller, Mrs. Cyrus C.
Brown, Richard E.	Mole, A. B.
Cleveland, Miss Mabel H.	Norman, Mrs. Bradford
Dillon, W. B.	Norton, Charles D.
Dows, David	Rippe, Mrs. E. J.
Fox, Louis V.	Stephens, Roderick
Gass, Frank	Stone, Miss Ellen J.
Goldman, Albert	Todd, Walter B.
Gould, Dr. Frederic S.	Varian, Wilbur L.
Graves, J. P.	Wagstaff, Mrs. Alfred
Hubbard Walter C.	Work, Bertram G.



THE NEW ORANG-UTAN, "ALI"



ZOOLOGICAL SOCIETY BULLETIN

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ABYSSINIAN LION, MENELIK

ZOOLOGICAL SOCIETY BULLETIN

Published by the New York Zoological Society

VOL. XVII SEPTEMBER, 1914 NUMBER 5

THE PANGOLIN OR SCALY ANTEATER

By C. WILLIAM BEEBE,
Curator of Birds.

HIDDEN deep below the surface of the ground beneath the dry plains of central and southern Africa and the humid jungles of India, Burma and the great East Indian Islands, are thousands of great reptile-like creatures, some a full six feet in length, covered from nose to tail-tip with a complete armature of scales; lizards in appearance; mammals in truth; orphans in classification. The Malays call them Tanjiling, which English tongues have twisted to Pangolin. Under his armor of scales the Pangolin or Scaly Anteater conceals a bodily structure as confusing to the scientist as is his general appearance to the layman. In common with other toothless or nearly toothless devourers of ants the Pangolin has usually been classed with armadillos and hairy anteaters. But his structure is so peculiarly Pangolin, his resemblances to other living creatures so slight, and the absence of fossil relatives so complete, that he has finally been assigned to an order of his own, *Pholidota* or the assemblage of scaly ones.

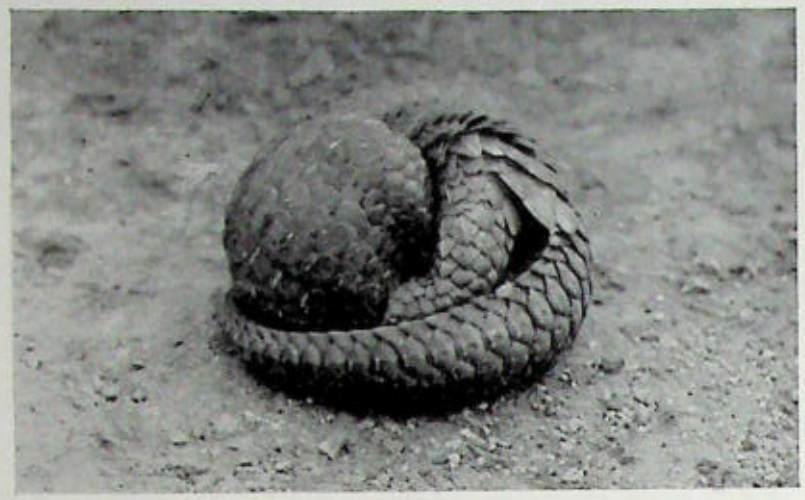
Throughout the days of violent sunshine or of tropical downpours, not one of the hosts of Pangolins ever shows himself; but in the dusk of evening the round, shingled ball stirs in its underground chamber, unrolls, stretches and the earth gives up its race of scaly anteaters. They come forth timidly, hesitating long at the entrance of the burrow before daring to shuffle forth on their quest for food.

The first time I caught sight of a Pangolin in Borneo I realized that it was one of Nature's later efforts. Although its form and scales were suggestive of some strange lizard, yet this is only a secondary resemblance. The helmet of the deep-sea diver recalls the helm of the medieval Knight; yet one is intended as a protection against a yielding liquid, the other to withstand blows of metal. In the embryo Pangolin the scales are little more than a mass of felted hairs, which harden after birth.

The world of night into which the Pangolin enters, is a world of conflict and fear; there is food in abundance, fruit, berries, mice, sleeping birds at hand, or there are hosts of creatures to be overcome and devoured only after a conflict. But the scaly one asks nothing of these. Peace to go his way, a populous ant-hill and a burrow to which to return—this plumbs the depths of a Pangolin's desire. His armor is for defense alone, his muscles impel no offensive blows, his powerful claws are sheathed, being only the implements of trade, the picks of a sapper and miner.

My Pangolin was dug up with the help of an obliging Tamil trailmender, the last heave of the shovel rolling him out upon the forest floor as inanimate as a glacier-worn boulder in a New England field, or like some gigantic, malformed pine cone. There was absolutely no vulnerable point of attack. A rounded back dwindled gradually into a long tapering tail, with part of a hind leg to fill up every intervening crevice. The tail muscles were as rigid as steel. Even with the spade as leverage, hardly an inch could be pried free. From the jaws of a leopard the scales would have slipped harmlessly away.

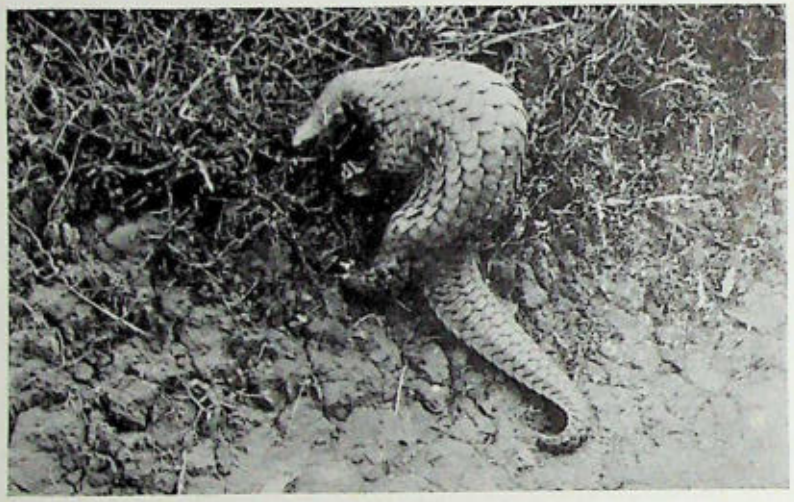
Left quiet for five minutes, the only signs of life were the lifting of some of the leaf-like scales of the hip. One imagined that there might



Rolled up with hip scales raised.



Unrolling.



Burrowing



Photographs by C. William Beebe

Normal walking position.

BORNEAN PANGOLIN, *MANIS JAVANICUS*

be eyes beneath; in such a strange creature any distribution of the sense of sight would not be unbelievable! This raising of the scales seemed in the nature of a trick, an invitation to a waiting enemy. Any attempt to seize one of those lifted scales resulted in disaster; like the jaws of a steel trap they closed down with such force as to bruise the finger cruelly, or actually to pinch off a fragment of flesh. One's enthusiasm for scientific investigation in this direction was satiated at one trial, which was also sufficient to prove that a Tamil trail-mender has a sense of humor and a lack of sympathy.

If the scale trap remained unsprung, the next sign of the evolution of the Pangolin was in the gradual drawing forth of his head, always with his fore paws held tightly across his face just below his eyes, like a boy cheating at blind man's buff. The little dull eyes looked about, then the long mobile snout came into play with its much keener sense of smell, and the ears with their sense, the most valuable of all to this animal. If the coast seemed clear, the tail swung around, the short legs gathered themselves together and the creature ambled off. With such perfect defense flight is useless, so his fastest gait is a man's slow walk. And his normal position on the march is very unlike that conceived and executed by the average museum taxidermist. His tail drags, his head is held low and his back is steeply arched, reminding one of the old Stegosaurus of Jurassic days. Indeed flight is impossible as it would be for an average man to attempt to run with armor of fifty pounds weight.

The Pangolin is made for ants, and ants alone: without them, he would starve at once; with a goodly supply it is difficult to conceive of his dying, other than from old age or overeating. The mouth is tiny, as only ants pass in; the tongue is very long, serpent-like in its mobility and covered with glutinous saliva. Why it does not englue as much earth as ants it is hard to explain. To attempt to subsist on the ants found wandering about the forest would be like harvesting wheat, grain by grain, so it is necessary for the Pangolin to go to the metropolis for supplies. This is perhaps the most important work of its life and we find it admirably adapted for it. Twenty very strong claws, backed by muscles of immense power suffice to tear through the anthills, hard almost as concrete. It can neither ensheath its claws like a cat, nor carry them raised above the ground as the screamer, so it folds them back, doubled up like jack-knives, beneath the soles of its feet, and thus walks upon them, the edges and points kept unblunted.

Home is usually a chamber at the end of an underground tunnel, but the Anteater sometimes climbs slanting trees in search of ants' nests, or of sanctuary in a hollow trunk. When cornered on a branch it will curl around the bough into as invulnerable a position as on the ground. Occasionally a Pangolin achieves Nirvana by burrowing into a giant anthill and there sleeps away his days and eats away his nights, until death relieves him of the sheer monotony of living. Such an accusation may be unjust, however, for in common with all organic beings, his safety and nourishment are but means to an end, and to continue his race he must find a mate. Of this phase of his life we know nothing, not even how he discovers or communicates with others of his kind. To be sure anthills are not innumerable, and there is little chance of finding a Pangolin elsewhere than at one of these insect cities, unless it be going or coming.

His voice is less than reptilian—a low, faint hiss; otherwise he is dumb; his eye-sight is so bad that if one stands still for a moment, the creature will crawl close to or between one's feet. But it flinches at the least sound and as it walks it is continually sniffing, moving its muzzle up and down. Doubtless they find one another by the perception of some odor too intangible for our coarse sense, or perhaps by the sound of digging into the anthills. It is said that sometimes a pair of these animals live together in the same burrow. As to the birth and youth of a Pangolin we have only the record of a single one born in captivity, whose scales were soft and fleshy until the second day. The young doubtless remain in their underground home until weaned.

Ants, both stinging and harmless, form the entire food, although we must extend this general term to include the neuropterous white ants or termites. I have counted five hundred fire ants in the gizzard of a Pangolin, their bites and stings powerless against the sticky, merciless tongue which played and played again among them, each time sweeping away scores. Lacking teeth, the creature swallows tiny pebbles which, as in a chicken, aid in crushing the hard bodies of the ants.

The study of the life of former ages has revealed nothing of the ancestry of the Pangolin. Two millions of years ago Pangolin-like creatures roamed the earth, presumably during the Oligocene nights, and feeding presumably on Oligocene ants, but even then so specialized as



BLACK-FOOTED PENGUIN

Even when swimming on the surface, the penguin is half submerged.



SIX BLACK-FOOTED PENGUINS
The penguins are quartered in the pool once occupied by the walrus.

to baffle us in seeking relationship with other groups. Today we know of six or eight species either placed in the genus *Manis*, or subdivided into still smaller groups.

The strange appearance and mysterious nocturnal life of these animals has made them a fertile source of superstition to the natives of countries as widely separated as Burma, Borneo and Africa. Indeed this is reflected in the generic word *Manis* which is the assumed singular of *manes*, ghosts. A wide-spread belief tells how the Pangolin lies relaxed with scales lifted, near an anthill. The ants pour forth in myriads to cut up the booty so near at hand, and crowd beneath the scales. The animal then closes down his armature, immerses himself in the nearest water, and freeing the ants, laps them up as they rise to the surface!

The sight of a Pangolin in the day-time is supposed by the natives to be extremely unlucky and is greatly regretted. The African Bechuanas have the cruel custom of burning these animals in their kraals to increase the fertility of their cattle. Elsewhere they are safe from molestation, both on account of these superstitions and from the fact that their flesh is too infiltrated with formic acid to be palatable. Until the excessive increase of human dominion and the consequent decrease of anthills comes to pass, the race of Pangolins will continue to flourish on the earth.

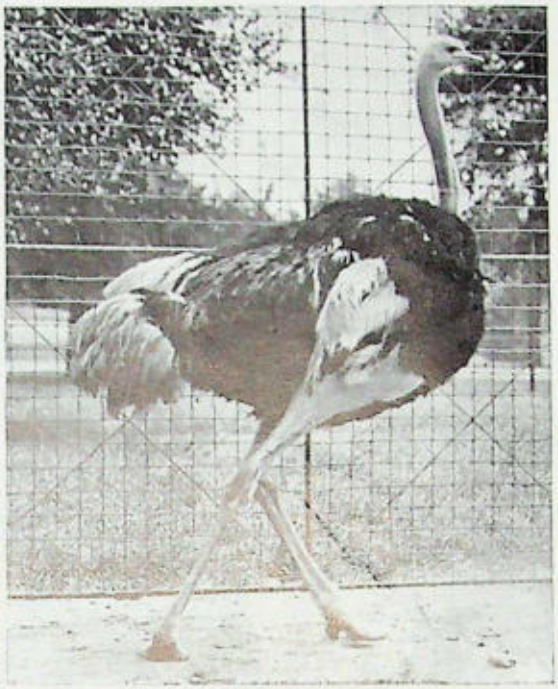
THE BLACK-FOOTED PENGUIN.

AS the seals are among mammals, so are the penguins among birds. Perfectly adapted for an aquatic existence, they are as much out of place on land as are their mammalian parallels. As the limbs of seals are specialized for swimming, so are the wings of penguins modified for this mode of progression. On land, the penguin is at a disadvantage and walks awkwardly. Usually it remains erect, moving with a curious waddling gait, but when closely pursued, it drops to the ground and, aided by its flipper-like wings, is able to travel more rapidly. When crossing rough ground it leaps from rock to rock, balancing carefully with its stumpy wings.

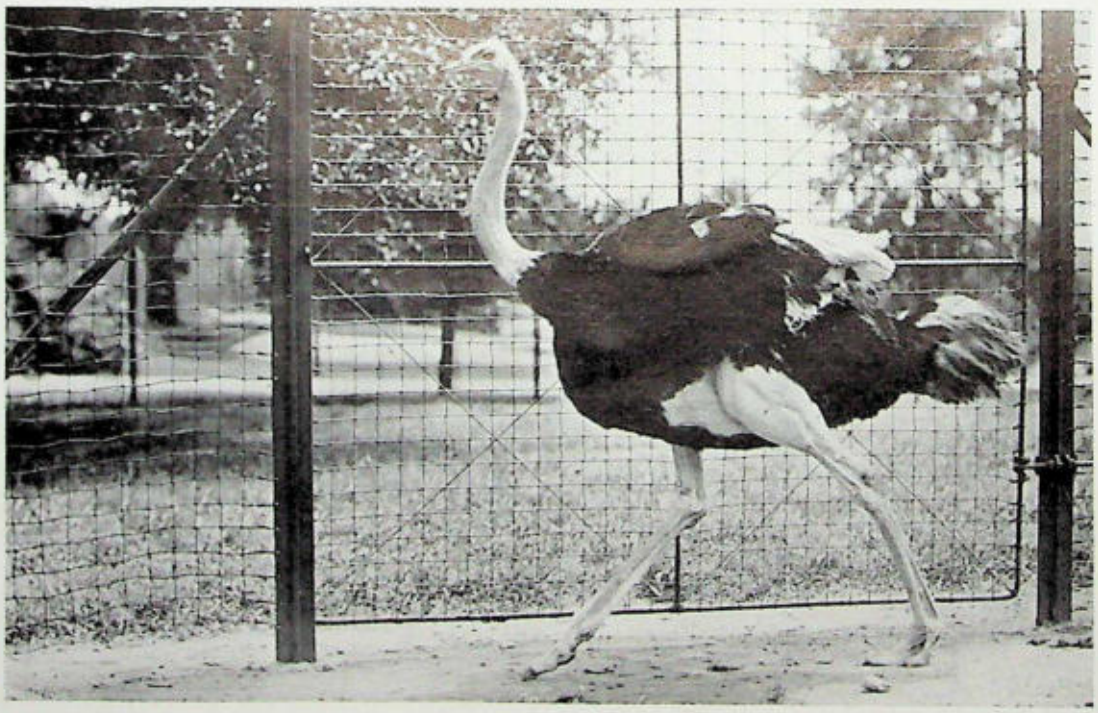
In its natural element, however, the penguin is a creature transformed. It darts about with incredible rapidity, so swiftly that the eye can



Posing.



Walking.



Running.

NORTH AFRICAN OSTRICH

scarcely follow its movements. The wings are moved synchronously, not alternately, as has often been stated. The feet play no active part in swimming, except possibly as an aid in steering, and trail helplessly behind, bottoms upward.

The penguins are an isolated group, having no near relatives. It is evident that they formed an early branch from the avian stem, and they retain many primitive characteristics. The feathers are poorly developed, and scale-like, especially those of the wings, where the primaries are hardly differentiated from their coverts. The bones of the wing are flattened and the joints are stiff, so that the entire appendage acts from the shoulder as an inflexible paddle.

About twenty species are known, ranging from the diminutive Blue Penguin, about sixteen inches in length, to the superb Emperor, which reaches a height of four feet. All are confined to the Antarctic regions, being most abundant in the vicinity of the Falkland Islands.

It is of interest to note that the extinct Great Auk exhibited a development parallel to that of the penguin, to which it was not closely related. Its flightless condition was not due to any unusual structural developments as in the antipodean birds, but simply to the very diminutive size of the wing which was perfectly formed.

Living penguins are always difficult to obtain, and hitherto, we have not been able to give our occasional specimens thoroughly adequate quarters, with salt water. Early this spring, however, a single black-footed penguin arrived at the Zoological Park. He was placed in the diving birds' tank in the Aquatic Bird House for a time and then, as spring appeared, he was quartered with the walrus as a companion, where he prospered. In July, five more specimens were obtained, and were introduced at once to the single occupant of the pool. After a satisfying bath in the artificial salt water provided, they at once made themselves at home, and now form an attractive exhibit. The potential energy represented by the extensive layer of fat stored beneath their skins should enable them to withstand any degree of cold to which they are likely to be subjected at this latitude.

Intellectually, penguins are not the most advanced of birds. Once they have become accustomed to confinement in dry quarters and to receiving food from the hand of their keeper, it is exceedingly difficult to persuade them to avail themselves of the privileges of the bath, and to secure their food in a normal manner. Thus, at first, our little flock suffered somewhat from the heat, refusing to enter the cooling water unless compelled to do so, neither could they be persuaded to feed on the killifishes with which the pool was supplied. After a short period of training, however, they reverted to more normal habits, and now pursue the fishes with remarkable agility. Also, they have deigned to accept the hospitality of a tarpaulin stretched over the rocks in a corner of their enclosure, affording them much-needed protection from the heat of mid-day.

L. S. C.

Mammal and Bird Colony.—The arrangement of the animals in the yards about the Yak House is about completed and the spectacle presented to visitors is quite impressive. A pair of fine yaks occupies a central position. These animals have developed to the stage where they are showy and picturesque. Moreover, they are active, and their capers are remarkably agile for creatures of their size. East of their spacious yard is a superb pair of elands. Roaming over the gently rolling range which is at an elevation from the visitor's point of view, the outlines of these animals against the sky line appear colossal. To the west of the yaks is a range of about two acres. This contains an assortment of kangaroos among which are represented the great gray kangaroo, the giant red kangaroo, the white-cheeked kangaroo and the greater rock wallaby. With the kangaroos are roaming several emus and a flock of guinea fowl. The surrounding ranges are occupied by ostriches, cassowaries and rheas.

New Specimens.—The collection at the Antelope House has been enriched by several showy and valuable specimens. We were particularly fortunate in being able to secure a number of African animals that recently arrived in this country. During the war in Europe and Africa the shipment of animals from the other side will be impossible. Among the new exhibits is a blotched giraffe, a pair of bonteboks, a male sable antelope and a fringe-eared beisa. The giraffe is a young specimen eight feet and three inches in height. Unavoidably it was shipped in a high crate, and we had considerable difficulty in bringing it through the city owing to the necessity of passing under the elevated lines and trolley wires. This giraffe suffered many hardships in its long journey from Africa, and was painfully injured during storms while on shipboard.

ZOOLOGICAL SOCIETY BULLETIN

Departments:

Mammals
W. T. Hornaday.

Reptiles
Raymond L. Ditmars.

Birds
C. William Beebe.
Lee S. Crandall.

Aquarium
C. H. Townsend.
Raymond C. Osburn.

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Elwin R. Sanborn,
Editor and Official Photographer

Vol. XVII. No. 5 SEPTEMBER, 1914

THE WAR AND THE ZOOLOGICAL GARDENS.

Close behind the great horrors of death and destruction that accompany the fearful war now raging in Europe, there speedily will come into view a long train of post-conflict consequences adverse to the interests of mankind. Not the least of these will be the results to the now rich and beautiful zoological gardens of England and Continental Europe.

Even in the crises of war, it is the way of civilized nations to spare the national treasure-houses of art, science and literature. In 1871 the Germans left the museums, art galleries and libraries of Paris quite untouched.

Inanimate collections can go through war's alarms unharmed: but every zoological garden within this war's sphere of influence is bound to suffer severely. During the siege of Paris, the large animals of the Jardin des Plantes had to be killed and eaten,—partly because there was no food with which to sustain them.

While our hearts are torn asunder by the thought of good friends in Germany, France, Belgium and England now arrayed in battle, or rushing to battle, we also dread and fear the evils that are bound to come to many of the zoological gardens involved. To them the first shock will come in a rise in the price of food; and that swiftly will be followed by great shortages in the daily supply. Already the European wild-animal market is dead and gone, and the gorilla that Mr. R. L. Garner landed in New York on August 24, via Rotterdam, is probably the last wild animal that will come from Europe during 1914.

The closeness of our relations with the defenders of wild life and the zoological gardens of England, France, Germany, Belgium and Holland bring the horrors of war closely home to us. Whichever side wins, we will be sorry for those who have lost. When the awful conflict is over, it will be our duty to see what we can do to help heal the wounds of the zoological gardens that have suffered most by the world-wide calamity.

W. T. H.

PENSION PLAN.

The rules and regulations governing the establishment, administration and disbursement of the Pension Fund Income Account of the New York Zoological Society were adopted by the Executive Committee on April 24, 1914, amended on July 8, 1914, and went into effect August 1, 1914. The $100,000 received from Mr. Carnegie has been invested by the Treasurer in first class securities. The members of the Pension Board in charge of the fund are:

OFFICERS.

George Crawford Clark, Chairman,
Percy R. Pyne, Treasurer,
Hermann W. Merkel, Secretary.

Representing the Board of Managers:—
George Crawford Clark,
H. Casimir de Rham,
Lewis Rutherfurd Morris,
William B. Osgood Field,
Percy R. Pyne.

Representing the employees of the Zoological Park:—
H. R. Mitchell, Assistant to Treasurer in charge of Pensions.
Hermann W. Merkel,
Raymond L. Ditmars.

Representing the employees of the Aquarium:—
Raymond C. Osburn.

CADWALADER ANIMAL FUND.

A check for $20,000 has been received from the executors of the estate of the late John L. Cadwalader, and credited to a new fund known as the Cadwalader Animal Fund. The income of this fund will be devoted annually to the purchase of animals.

ENDOWMENT FUND.

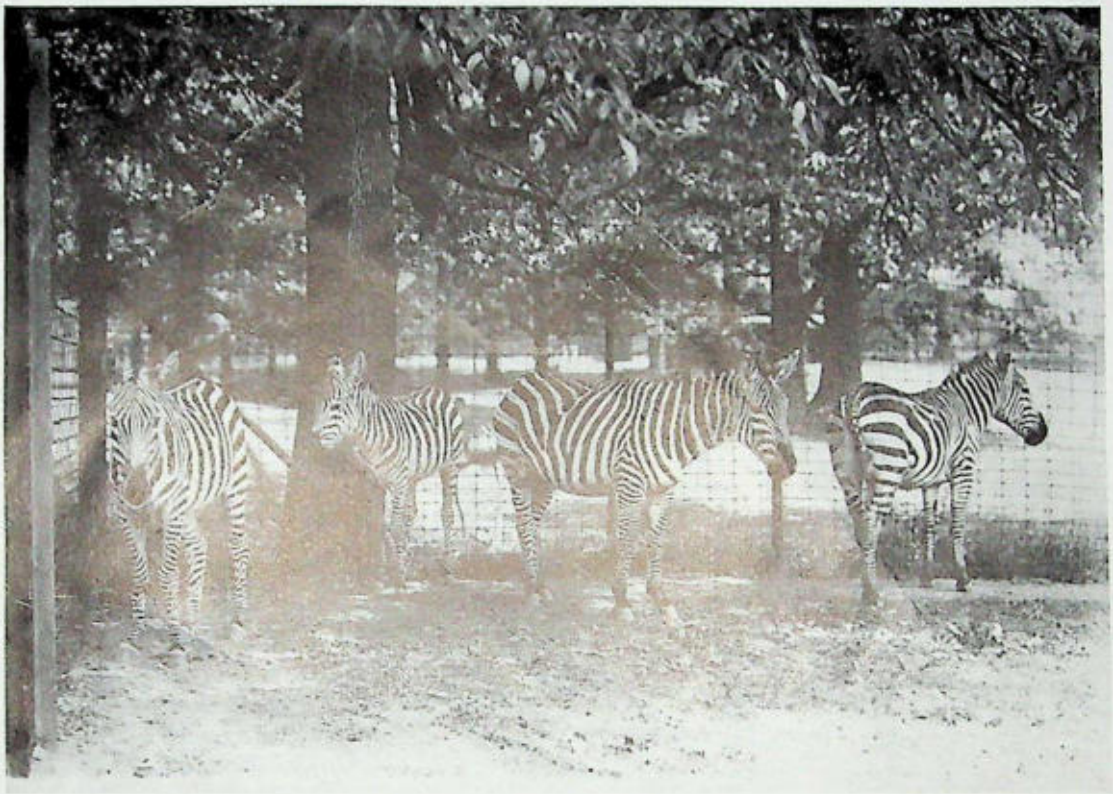
Under the provisions of the will of the late Mrs. Morris K. Jesup, a Life Member, the Society is to receive the sum of $25,000.





YOUNG FEMALE GORILLA, THREE YEARS OLD, FROM THE FRENCH CONGO TERRITORY

Collected by R. L. Garner. Received August 24, 1914.



GROUP OF GRANT ZEBRAS
Recently arrived from the Hagenbeck Preserve in German East Africa.

THE ZOOLOGICAL PARK GETS A GORILLA.

Two years ago the New York Zoological Society sent Mr. R. L. Garner to Africa to procure one or more gorillas, civilize them there, and finally when well settled in the food habits of civilization bring them to New York.

After many jungle explorations and vicissitudes, Mr. Garner landed in New York on August 24, bringing with him what is certainly one of the finest gorilla specimens that ever came alive from Africa. Dinah is a female, three years old, and at present in perfect health —thanks to Mr. Garner's careful development of her habits and temperament. She is cheerful and affectionate, very lively and full of playfulness, and her appetite is everything that could be desired.

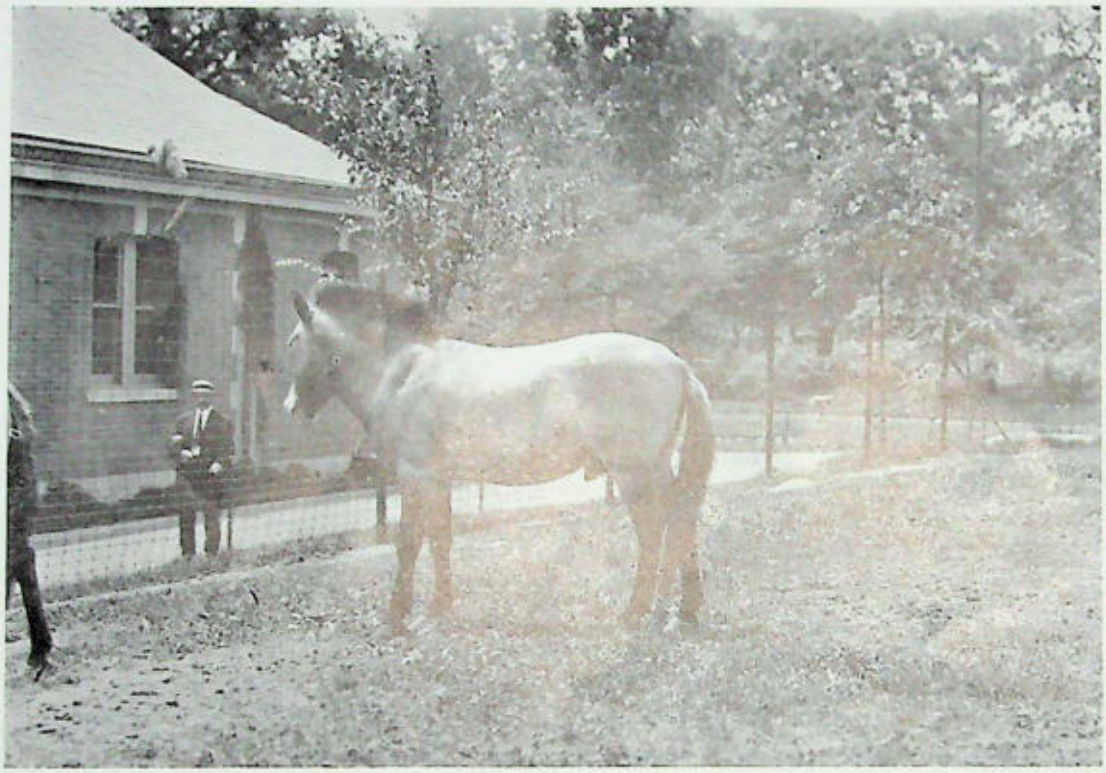
In all these particulars this gorilla is wellnigh the direct opposite of nearly every gorilla that ever came out of Africa. Usually gorillas in captivity are morose, or even sullen, capricious in appetite and strongly opposed to taking physical exercise. There is every reason to hope that Dinah will live long, and prosper.

Incidentally the Garner Gorilla Expedition was a most gratifying success.

ZOOLOGICAL PARK NOTES.

Shipping Deer.—We have been busy this summer crating and shipping some of our surplus deer which have been sent to various parts of the country. The capturing and crating of such extremely wild creatures as the sika deer, axis deer, the white-tailed deer and the red deer, require considerable skill and ingenuity. Several of our keepers have been especially trained for this work, but for various conditions we lay out systematic campaigns, and in this way are able to crate our animals without so much as a scratch or bruise.

New Woolly Monkeys.—We have added two more specimens of the Woolly Monkey to the interesting exhibit that has for some years been kept at the Reptile House. The new arrivals



MONGOLIAN WILD HORSE
The wild horse installation has prospered beyond all expectation.

were brought to New York by the Roosevelt Expedition. These animals have the reputation of being delicate in captivity, and therefore require special care.

Swimming Frogs.—A rare Swimming Frog has been added to the collection in the Reptile House. There are two dozen specimens, collected in South Africa. These belong to a small family of frogs, the members of which never leave the water. They have a curious habit of croaking under water, making sounds like the jingling of small bells.

Coscoroba Geese.—Among the birds which reached the Zoological Park shortly after its inauguration, were four Coscoroba Geese, which came on October 2, 1899. Two of these specimens survived until 1904, but since that time the species has not been represented in the collection, nor has it appeared in the American market.

In June of this year two birds were offered for sale and we were able to secure them. They are curious creatures, and their status has caused much discussion. They have been compared at different time to the swans, the ducks and the geese, but that the latter are their closest relatives is now generally conceded.

Their plumage is entirely white, with the exception of the primaries, which are tipped with black. They are about the size of the White-fronted Goose, but the neck is considerably longer, and even swan-like, which led to their inclusion with these birds. The beak is light pink, and in shape suggestively like those of the sheldrakes.

They are inclined to be delicate when first imported, but once established, like most of the geese, they are hardy and long-lived.

Abyssinian Lion.—Quartered in the center cage of the Lion House is one of the finest Abyssinian lions that has reached America in many years. Menelik is of the type in which the mane ends at the fore portion of the shoulders, thus disclosing the great muscles that sculptors are so fond of delineating. He is of great size and of a particularly striking tawny hue. Because of the age of Sultan, he at once ranks as the star of the collection. No lion that we have ever exhibited has shown more docility and good sense than this new ar-



SPRING-BUCK AT THE ANTELOPE HOUSE
The antelope collection is very complete and interesting.

rival. He immediately became friendly with his keepers.

Primate House Improvements.—Extensive alterations are taking place in the Primate House. We are endeavoring to render this building as disease proof as possible, and all partitions are being filled with cement and the walls of the cages are being covered with an especially heavy and tenacious fibre which is water-proof and aseptic. New floors are being constructed in the smaller cages, and while the work is extensive we have been able to keep the building open to visitors. The health of the great orang "Ali" continues to be good and the animal is in the best of spirits. He is so powerful that every portion of his cage was necessarily strengthened.

A Skilled Mountaineer.—Our visitors are treated to a rather remarkable spectacle at the northerly section of the Mountain Sheep Hill. In the north corral is an extremely lofty oak with wide spreading branches, and visitors are quite amazed to see a number of goats walking out on the limbs of this tree at a great elevation. These animals are the Himalayan tahrs. They are the most agile jumpers and climbers on exhibition in the Park. We have erected a series of posts, in step-like fashion, and these goats jump from one to another and finally into the tree. They seem quite at home in their arboreal playgrounds and there has never been a fall.

The Nubian Giraffe.—The fine Nubian giraffe that arrived here several months ago exhibits a remarkable antipathy to passing through the door of his stall. We imagine that at some time this animal has struck his head in passing through a door and the impression still lingers when he is coaxed to go through. He has stood and looked for weeks through his door at the spacious yard, but it is impossible to entice him out. Two weeks ago he slipped at the doorway and in terror dashed through the opening. Once in the yard it was impossible to get him in again. During a thunder storm we were much concerned about this animal. Giraffes are much inclined to be thrown into a panic with each lightning stroke and we were afraid the animal would dash about his corral and injure his limbs against the fence. We tried in every way to coax him



BUSH PIG: BOSCH VARK

A rare specimen of the wild swine found in the moist forests of South Africa.

into his stall, while he quivered at every peal of thunder. At last we tied a rope around his neck and dragged him in out of the rain and wind, and from that time on he has not set foot in his yard. We are nearly in despair about teaching him to pass through his door, which really gives him a generous amount of head clearance.

A Nile Monitor.—For the first time we have exhibited a specimen of the Nile monitor at the Reptile House. This great lizard has been famous from the time of the Egyptians. It attains a length of six feet. It has a flattened tail and is a powerful swimmer. The monitor is rated as a useful reptile owing to its habit of eating the eggs of the dangerous Egyptian crocodile. In color it is black with a network of yellow markings. It is a savage creature and the keepers are wary about entering its yard as it has a habit of dealing formidable blows with its long tail.

Pasturing an Elephant.—The rare pygmy elephant Congo, which stands as the type specimen of its species, has recently been troubled with rheumatism and his condition has required special treatment during the present summer. We have thought that Congo's discomfort might be relieved by placing him on soft ground, and he was taken to the southerly portion of the elk range in which there is a shallow lake. Congo is delighted with his new surroundings and spends the greater part of his time in the water, sometimes lying on his side and employing his trunk to throw geysers in every direction. On warm nights he is inclined to wade about the lake, but during the recent cool spell he has systematically retired to a shed nearby. He has shown gratifying signs of improvement.

WILD MUSCOVY DUCKS.

OF the many species of wild ducks, only two have shown themselves capable of holding a place in the list of domestic creatures. The mallard was domesticated many centuries ago, and so well has it thriven that its descendants, disguised in a great diversity of form and color, stand next to the offspring of the jungle fowl as factors in our domestic bird life.

The Muscovy, on the other hand, has shown but small tendency to vary, except slightly in color. This may be accounted for by the fact that its introduction in Europe is comparatively recent. Even in this space of time, however, a pure white and a bluish variety have been evolved, and the normal black body of the wild bird is variously marked with white in the common domestic form. Although somewhat greater in bulk, these captive birds have not lost the power to fly, the ridge of a house or barn being a favorite roosting place.

Muscovies will cross with other ducks, but the hybrids are invariably sterile. A pair of these birds, bred from a Muscovy drake and a Rouen duck, are now in the Zoological Park, the gift of Mr. E. V. Carey.

In its natural state, the Muscovy duck ranges from Central America through tropical South America, wherever water is to be found. It nests and roosts in the trees, after the fashion of many other South American representatives of normally terrestrial groups. Both sexes are entirely black, with the exception of the greater wing coverts and axillaries, which are white. The head of the male is covered with dark red caruncles and he is considerably larger than his mate. While domestic birds sometimes approach wild specimens in color, they can be detected almost invariably by a generous sprinkling of white.

For some obscure reason, real wild Muscovies are very difficult to obtain. They are almost never seen in the possession of natives, who may have numbers of tree and other wild ducks. The young are not difficult to rear and while birds of this species generally are not so abundant as the tree ducks usually found in the same localities, they are not so rare as to make the finding of a nest an impossibility. It may be that the natives are not attracted by the sombre Muscovies and do not attempt to secure them, or perhaps because it is much easier to obtain the eggs of domesticated birds, the wild ones are not considered worth while. At any rate, their extreme rarity in captivity remains a fact.

On June 1, 1909, the Zoological Society received from Argentina a pair of Muscovy Ducks, reared from the eggs of wild birds. They were fully adult, and the female was quite healthy, but the male was in poor condition and soon succumbed. In following years, the female laid regularly. On one occasion, she mated with a spur-winged goose, and a hybrid was hatched, which unfortunately we were not able to rear.

In the spring of 1913 a second pair of birds of untainted blood was brought from Colombia. They were younger than the first pair, and the female has not laid as yet. The male, however, this year paired with the old duck, and we now have six sturdy young birds. It is our hope to be able to establish a flock of pure wild Muscovy Ducks, which undoubtedly would be unique among zoological collections.

L. S. C.

DEADLY SNAKES OF SOUTH AFRICA

By Raymond L. Ditmars.

AN exceptionally interesting book has recently appeared which presents a thoroughly sympathetic review of the habits of South African serpents. The author is Mr. F. W. Fitzsimons, now Director of the Port Elizabeth Museum.

We had already noted the unique and dangerous habit of the South African ring-necked cobra or ringhals, spitting its venom when angry, but Mr. Fitzsimons further enlightens us regarding this snake. He explains:

"I have scores of times purposely irritated our captive Ringhals snakes, and closely observed the manner in which they ejected the fluid. The fluid is not saliva, as generally supposed, but pure venom ejected in two streams from the poison fangs. When the snake struck the glass in the act of spitting, the venom was ejected from the fangs in two streams which ran down the glass, but if a couple or more feet away, would be sprayed in a fine shower. This spraying of the venom is mainly accomplished by the expulsion of air from the lung sac, simultaneously with the ejection of the venom from the fangs. The air is expelled very forcibly and is accompanied by a short but loud hiss.

"The venom is evidently secreted at a very rapid rate when the snake is enraged, for I observed that a large Black Ringhals discharged five showers of venom within as many minutes. For the first day or two of a Ringhal's captivity, it spits at every one who approaches. A single snake covered a sheet of plate glass four feet by four feet, all over with venom in a day.

"The venom on exposure rapidly hardens, cracks irregularly, and assumes a straw-yellow color. When first ejected it is colorless and is of the consistency of glycerine.

"On many occasions I have scraped the ejected venom from the glass of the Ringhals'

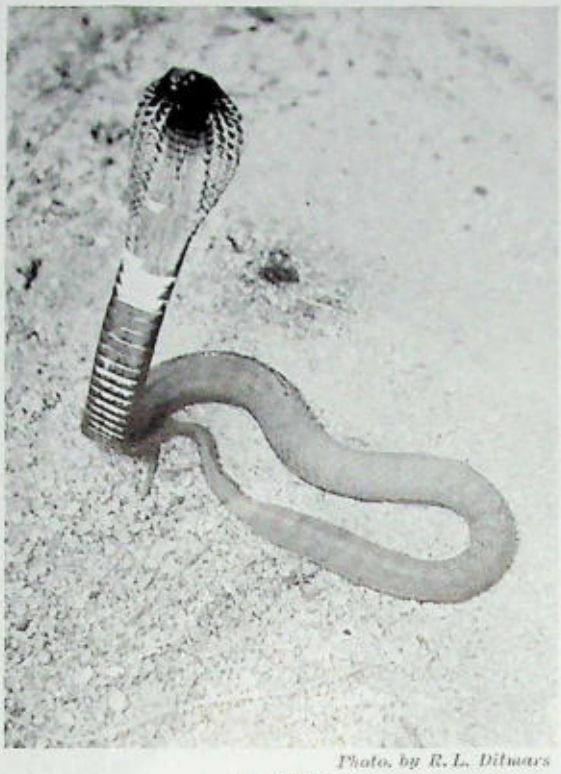


Photo. by R. L. Ditmars

RINGHALS

cage and injected it into animals. It, in every case, proved fatal to them, killing them off as rapidly as if the snake had bitten them. Venom which had been on the glass in a dry state for two years was found to be quite as poisonous as fresh venom. The Ringhals is well aware of its spitting power and its value as a weapon of defense, which is proved by the intelligent way in which it goes about the business.* * * * I have experimented many scores of times and know for certain the Ringhals always directs its venom at the face of its foe. It is needless to go into detail as to all my methods to ascertain that this is a fact.

"It seems wonderful that the snake should possess the instinctive knowledge that unless the fluid enters the eyes, it is innocuous, for it has no effect whatsoever upon the unbroken skin. This spitting power has undoubtedly been evolved as an extra weapon of defence—the serpent's object being to blind its foe and then make its escape.

"It is quite a common occurrence for dogs to lose the sight of one or both eyes. When out in the field one day, my pointer dog became suddenly rigid and 'pointed.' Advancing to investigate, a Ringhals reared up, lunged forward and the next instant the dog was running about and crying out most piteously. I did not know in those days what to do in such emergencies, so I got the dog home as best I could, but the poor beast never recovered his sight."

The preceding habits of the Ringhals are of particular interest to readers of the BULLETIN just now, as we have received graphic letters from Mr. R. L. Garner, who is in Africa collecting gorillas for the New York Zoological Society and in the letter Mr. Garner recites the menace of the terrible snake described.

Continuing our examination of Mr. Fitzsimon's book we are surprised to learn that the country covered by his researches contains a more formidable snake than the Indo-Malayan king cobra to which we had previously awarded first honors. From past observations the writer had imagined this serpent to be the most crafty and diabolical of all poisonous snakes, but South Africa appears to have a rival, which, from Mr. Fitzsimon's description, is the most dangerous reptile in the world. This is the mamba, of which there are two varieties, representing a species technically known as *Dendraspis angusticeps*. The mamba is actually a tree cobra. Our enthusiasm for the possession of this vigorous reptile grows with every paragraph of its habits and a letter has already left for South Africa containing an order for mambas. Mr. Fitzsimons says in part:

"In Natal the most dreaded of all snakes is the Black Mamba, and a report of one being in the neighborhood sends a thrill of fear through people living in the vicinity. And well it may, for during the pairing season these snakes are very aggressive, and will at times bodily attack any one courageous enough to venture into their haunts. They often prowl around the habitations of man, drawn thither by the presence of chickens, rats and mice. If attacked they will show fight, and so quick are their movements that the aggressor must have all his wits about him and be well armed, else the chances are he will lose his life.

"Black Mambas have been killed which measured thirteen feet from nose to tip of tail. It is almost a daily occurrence for Black Mambas averaging eight to nine feet in length to be killed in Natal, Zululand and Transvaal.

"Some of the favorite resting places of Mambas are the branches of thick-foliaged trees. Entwining themselves amongst the twigs they lie perfectly still. They frequently select branches of trees overhanging the Kafir paths



Photo. by R. L. Ditmars

PUFF ADDER

which wind through the forests in various directions. These Kafir paths are made by the natives, who always walk single file. They are merely tracks worn by the feet of the natives. Many a native has met his death by being bitten on the head or neck or shoulders whilst passing under a branch in the foliage on which one of these venomous snakes lay concealed.

"One day when out buck-hunting I was leisurely riding along a Kafir path in the outskirts of a forest when suddenly a black streak shot out from a clump of stunted bush a few yards ahead, and next instant I saw it was a great Black Mamba, and that it had buried its fangs up to the hilt in a burly Zulu's bare shoulder.

"The native with a hoarse yell, bounded into the air, fell, recovered himself, and rushed away at full speed down the path. Making a detour to avoid the snake, I came upon the man ten minutes later in the throes of death.

"Naturally, in all cases death would not have been so startlingly sudden, but the man received a full bite in the shoulder-muscles by a large and vigorous snake, and running at such great speed the blood coursed with tremendous rapidity through his blood vessels, and quickly carried the venom to every part.

"The Black Mamba, as a general rule, has some secure retreat to which it decamps when alarmed. If a Mamba be surprised when out in the open, and if you happen to be between it and its retreat, it will not rush off in an opposite direction as most animals would do, but will instantly dart off at terrific speed, apparently charging right at you. If a Mamba should act in this manner, and if you are not prepared to defend yourself, your safest plan is to sprint off without an instant's delay. Whilst travelling at great speed, a Mamba can strike right and left with consummate ease, without apparently abating its speed in the slightest. To stand in the path of a Mamba rushing off to its lair, is fraught with the gravest danger even if well armed. At such times the nerves are none too steady and it is as likely as not that even an expert with the gun will miss his aim. There is no time for reloading not even time to take second aim should the gun be a double-barrelled one, before the snake has swept past, and in the passing deposited its death-dealing venom.

"When making off through the bushveld, the Black Mamba, with a rapid and continuous succession of forward propulsions glides over the stubble, the head and anterior part of its body being sometimes several feet off the ground. When a bush fire is raging, Mambas may be seen escaping in this way at a swift pace. Viewed at a distance they seem to be gliding over the tops of the long grass and low shrubs. Cases are on record of men being bitten as high up as the thigh, when mounted on horseback."

R. L. D.

COLONIZING THE BIRD OF PARADISE.

The Greater Bird of Paradise on Little Tobago Island.

NOW that the protection of birds is receiving the attention it so long has deserved any means for obtaining the preservation of threatened species is of interest. Birds of Paradise have been among the most persistently persecuted for millinery purposes, and it has seemed that nothing could prevent their total extermination. The Greater Bird of Paradise has suffered probably more than any other species and is now so rare that for several years no living specimens have been obtainable. When this fact was brought to the attention of Sir William Ingram, he at once formulated a plan that is almost unique in the annals of bird protection.

The first step was to secure a suitable preserve. This was accomplished by the purchase of Little Tobago, an island lying somewhat to the northeast of Trindad. Mr. Wilfred Frost, a well-known live bird collector, was then sent

to the Aru Islands, Dutch New Guinea, to secure specimens of the Greater Bird of Paradise, with the result that forty-four birds, all immature, were liberated in their new West Indian home in September, 1909. Later on, three others all supposed females, were added.

In the Avicultural Magazine for November 1913, Mr. Collingwood Ingram gives an account of a visit made to Little Tobago on January 2, 1913, by himself and his father, the originator of the idea. They found the island to be more than a mile in length, its whole surface corrugated by a series of tiny hills, with their intervening valleys and entirely covered with dense vegetation. The only fresh water available is that supplied by a small spring, unfit for human use. The birds were never seen near it and are believed to secure from the heavy dew whatever moisture is necessary.

Clearings have been cut in various places on the island, and papaws and plantains planted. Here the birds of the island congregated and the visitors were delighted to be able to estimate the number of Birds of Paradise as at least thirty. None had as yet reached the age at which the side plumes are assumed, but the birds seem to have bred, as the warden placed on the island reported seeing several young birds accompanied by their mothers.

The fact that this number of birds remains on the island after the elapse of more than three years is most encouraging. It was the general belief that most, if not all, of those birds which survived the journey and were able to establish themselves on the island, would migrate as soon as possible to the larger islands not far away. This, however, has proved not to be the case, and there is every reason to believe that the birds will increase and this remarkable experiment prove a decided success.

L. S. C.

A RARE GIRAFFE.

BY a strange assortment of circumstances by no means quite easy to understand, the African country, which is by far the best equipped with giraffes, has contributed no living specimens (so far as we are aware) to the zoological gardens and parks of the world. British East Africa possesses in her own right three well-marked giraffe species: the reticulated (*Giraffa reticulatus*), the Uganda (*G. rothschildi*) and the Blotched or Masai giraffe (*G. tippelskirchi*).

Up to this date only one reticulated giraffe has come to America alive,—to a traveling show; and to the misfortune of the animal-loving public it died in a short time. We cannot learn that the Uganda giraffe ever has been seen alive in America; and until very recently the same was true of the blotched giraffe.

Six months ago the agents of Carl Hagenbeck captured in German East Africa three fine specimens of the blotched giraffe, two of which were reserved for us, and were immediately purchased. Unfortunately, two specimens of the trio either died or were accidentally killed in transit, and on receipt of the meagre news of their death we abandoned hope of ever seeing the third specimen safely landed in America.

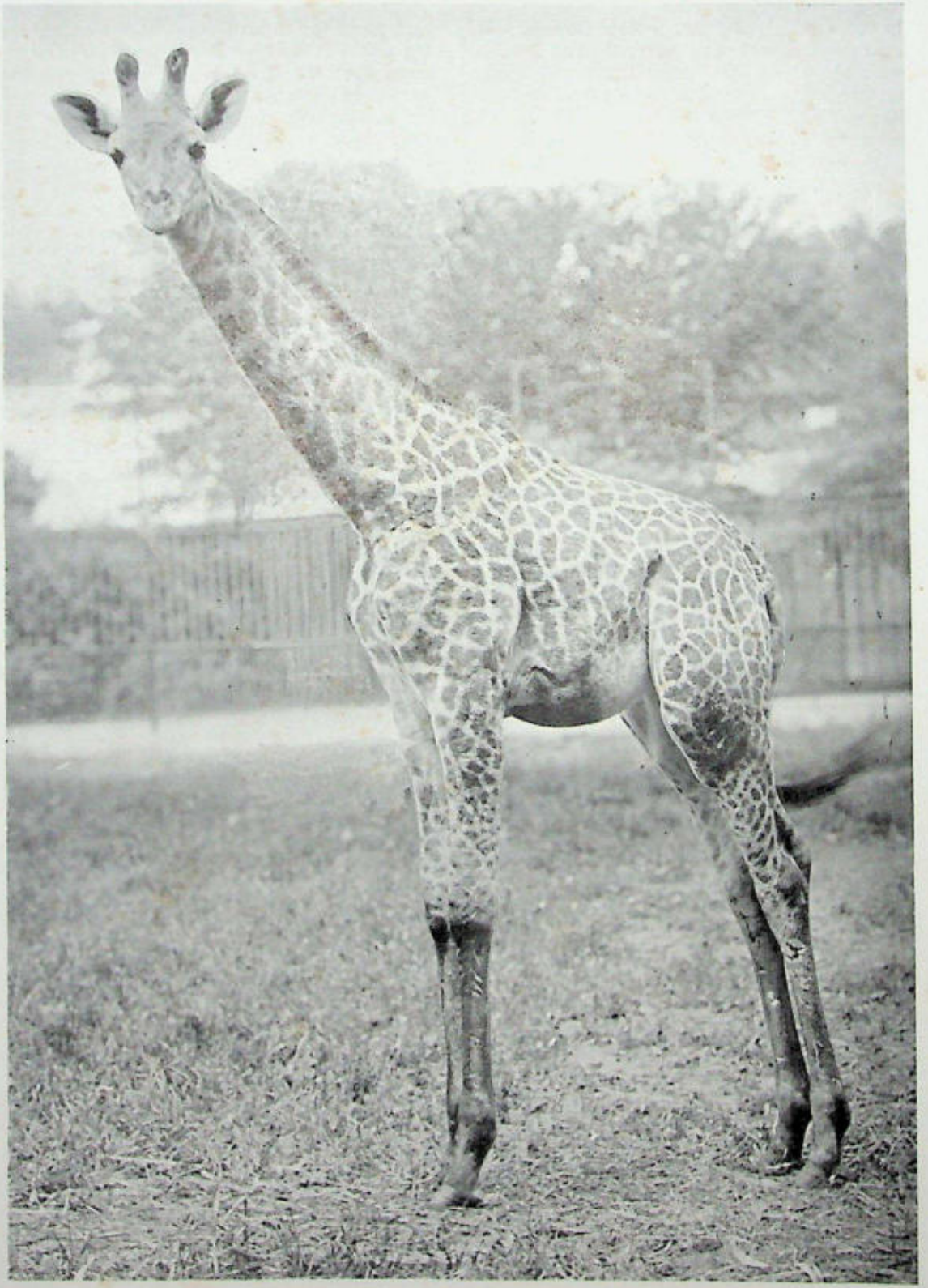
But our fears were not realized. After two long and fearfully tiresome journeys by water, the surviving specimen reached Baltimore last June, and finally landed in the Zoological Park, cramped, stiff and misshapen. It was not until eight weeks had elapsed, with constant grooming, that the new giraffe was in sufficiently good shape to photograph.

The Blotched or Masai Giraffe is a giraffe of striking appearance. The typical skin ornament of a Nubian or a Cape Giraffe consists of a large irregular fawn-colored blotch surrounded by white. In the Blotched Giraffe this ornament takes the form of a rosette, which is small, and cut with deep indentations until it becomes almost star-shaped. These starry markings are small, but on the body and legs they are very numerous, and impart to the animal a richness of color and a bizarrety of appearance that is very striking. On the neck the rosettes are larger, but not so star-like, and in some individuals they then become mere elliptical patches of color.

The specimen of *Giraffa tippelskirchi* now shown in the Antelope House is a female, about eight feet three inches in height, and it was born early in 1913. Being now in good health and feeding well, we have reason to hope that it will live here at least ten or fifteen years. The largest giraffe of this species shot by Col. Theodore Roosevelt for the United States National Museum was seventeen feet two inches in height. It was taken at Ulu, British East Africa, near the Uganda railway.

Our specimen was captured in a huge private preserve held by Carl Hagenbeck in German East Africa, as a concession from the German Government, specially set aside for the benefit of the zoological gardens of the world. In that preserve the agents of Carl Hagenbeck may capture alive as many wild animals as they can, but shooting is forbidden.

W. T. H.



BLOTCHED GIRAFFE IN THE ZOOLOGICAL PARK

Young specimen recently purchased by the Society.

ZOOLOGICAL SOCIETY BULLETIN

AQUARIUM NUMBER

Prepared by C. H. Townsend, Director, and R. C. Osburn, Assistant Director.

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OCTOPUS CLIMBING UP THE SIDE OF THE TANK AT THE AQUARIUM

ZOOLOGICAL SOCIETY BULLETIN

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BIOLOGICAL INVESTIGATIONS IN LONG ISLAND SOUND

DURING the latter part of June and the early part of July the United States Bureau of Fisheries undertook a series of dredgings in Long Island Sound with a view to ascertaining the character and abundance of the animal life on the bottom. The Fisheries Steamer "Fish Hawk" was detailed for the purpose and ran lines of dredgings east and west, lowering a large beam trawl at frequent intervals. Surface and bottom observations on the temperature and salinity of the water were recorded with special instruments at each dredging station occupied by the vessel.

Such work had never been done in the western part of the Sound and it was believed that great quantities of animal life would be brought up. The collections made consisted largely of crustaceans, mollusks and starfishes, but many kinds of invertebrate animals were obtained together with bottom inhabiting fishes, such as flounders and sculpins.

The bulk of the collections were landed from time to time at the biological laboratory at Cold Spring Harbor for study. The details of the work were arranged for the Bureau of Fisheries by Dr. Charles B. Davenport, Director of the Laboratory at Cold Spring Harbor and by Dr. C. H. Townsend, Director of the Aquarium in New York. By direction of the Bureau, Dr. Townsend had personal charge of the work of the vessel and was granted leave of absence by the New York Zoological Society for that purpose. The Fish Hawk is a vessel about 160 feet in length and carries a naval crew of 43 men. She is used mainly for coastwise investigations of fishing grounds.

The use of the large beam trawl revealed spots where flounders could be taken for market by trawling vessels.

Long Island Sound yields a good supply of food fishes, most of which are dependent upon the abundance of small invertebrate forms for food. There are large numbers of edible crabs in the shoaler portions as well as oysters, clams and mussels.

Seventy hauls of the beam trawl were made in depths varying from five to twenty-five fathoms. Very few hauls were made near shore as both sides of the Sound are occupied by wide fringes of staked and cultivated oyster beds, the dredgings were in the deeper waters lying between them.

The character of the contents of the trawl in most of these hauls was monotonously similar. There were usually three species of flounders, some skates, mutton fish, young whiting, hake, herring and a few butter fish and cunners. Among the invertebrates were numerous spider crabs, rock crabs, hermit crabs, large whelks, a few starfishes, and an abundance of small shells of a score or more species. Starfishes are of course more abundant on the adjacent oyster beds. There were no edible blue crabs, no horseshoe crabs, very few mussels, oysters, squids or lobsters, but nearly always considerable mud filled with marine worms. There were very few of the shore fishes.

Flounders were more abundant than any other fishes and were feeding on the marine worms that are in the bottom mud everywhere. Sometimes as many as 200 flounders came up at one time. It is likely that flounders are more abundant than the dredge hauls indicated since the beam trawl is not a very effective fishing device. It moves slowly along the bottom and the larger and more active fishes can easily keep out of its way as it is only eight feet wide.



U. S. FISHERIES STEAMER, FISH HAWK

There is little doubt that good flounder fishing could be had in most of the deeper parts of the Sound. A good many large hake were taken in the deeper waters and it is possible that hand-line and trawl-line fishing would bring up many more than any kind of a beam trawl could take. A small sized otter-trawl was used with only fairly good results, being too small for satisfactory tests.

The dredgings show that many kinds of fishes and invertebrates known to be abundant in Long Island Sound are not found in the deeper and cooler waters in mid-summer, but move inshore and are then to be found in the shoaler and warmer waters where most of them spawn.

The extensive areas occupied by oyster beds were not of course dredged upon by the Fish Hawk. Neither was the immediate shore region examined with fishing nets. This can be done later, without the use of the ship. The vessels of oyster growers are at work in mid-summer on the oyster areas taking up seed oysters and dead shells to be distributed elsewhere, the stirring up of the oyster beds by such work attracts many kinds of fishes and there is often excellent fishing on the oyster grounds.

Among the fishes found there and also along shore in summer are striped bass, weakfish, eel, tom-cod, porgy, sea bass and fluke, not one of which was taken in the Fish Hawk's beam trawl.

Our deep water dredgings, as we call them, show *mid-summer* conditions only. In winter they would be somewhat different, when freezing weather drives the shore life away and into deeper waters. It would be interesting to have some dredging done in winter to determine the number of shore forms in the deeper parts of the Sound at that season.

It is too early to draw conclusions until the shoal water aspects of the subject can be considered in their relation to the deep water dredgings. Neither are the deep waters fully explored, since the dredging or rather beam trawling work should be supplemented by the use of other devices better adapted to fish catching.

Large otter-trawls must be used before we can speak definitely as to the character and abundance of fish life at the bottom. When the seasonal movements and distribution as well as the food supply of these creatures is ascertained, the subject will have a fishery as well as a scientific interest.

It is interesting to know that the muddy bottom is full of worms and mollusks, and that there are good fishes there for the angler. Anchored trawl-lines, with many hooks, ought to bring up fishes in abundance.

The observations made at each station with respect to temperature and salinity of the water, show that there are almost always distinct differences in these respects between surface and bottom.



U. S. S. FISH HAWK—DETERMINING BOTTOM TEMPERATURE AND SALINITY



U. S. S. FISH HAWK—OTTER TRAWL GOING DOWN

The dredging stations occupied by the Fish Hawk were accurately platted upon charts by the naval officers attached to the ship, which when published together with lists of the species obtained, will be of interest to anglers and naturalists alike. Mr. Madison Grant, Chairman of the Executive Committee, spent two days on board, and Dr. Davenport of Cold Spring, and Dr. Osburn of the Aquarium, each assisted in this work on board the vessel for a few days. Mr. Sanborn, of the Zoological Park, spent a day on board making motion pictures of the methods employed in marine investigations, which should prove of interest, and will doubtless be exhibited at the next annual meeting of the Zoological Society.

One result of the Fish Hawk's work was the collecting of live specimens for the Aquarium.

The Bureau of Fisheries has authorized the publication of the results by the New York Zoological Society, and it is likely that this will prove desirable. C. H. T.

MOVEMENTS OF SEA ANEMONES.

By R. C. Osburn.

SEA-ANEMONES as a rule are not great travelers. It is quite probable that many persons who are familiar with the appearance and structure of these polyps have never observed them to move, and may not even be aware that they are capable of locomotion.

Some species move more rapidly than others—or less slowly, more properly speaking—but even with the speediest of them, it is necessary to watch them very closely to see that they move at all. As a rule one can see that they have moved only by comparing the positions assumed from day to day. Probably those of our ancestors who were responsible for the old sayings did not know about this; otherwise when they were selecting an object to represent the limit of deliberation they would have given us not "as slow as a snail," but as slow as a sea-anemone.

Probably some sea-anemones favorably situated as to food and oxygen never change their location—at least certain individuals at the Aquarium have remained for months without any change of position. It is conceivable that those less comfortably situated might be able to better their conditions by a change of locality. When this is done, the method known to students of animal behavior as "trial and error" seems to be the only way of attaining the desired situation. Again the method of asexual reproduction known as fragmentation, by which buds are cut off from the base of the parent, would require some shifting of position in order that the family thus derived might not be too much crowded and that all might have an opportunity to secure food. But why such an animal in an aquarium jar, supplied with sufficient oxygen and with all the food it would consume and not possessing the sort of family just described, should be seized with the "wanderlust" when all of its fellows were content



U. S. S. FISH HAWK—OTTER TRAWL BEGINNING TO SPREAD OUT

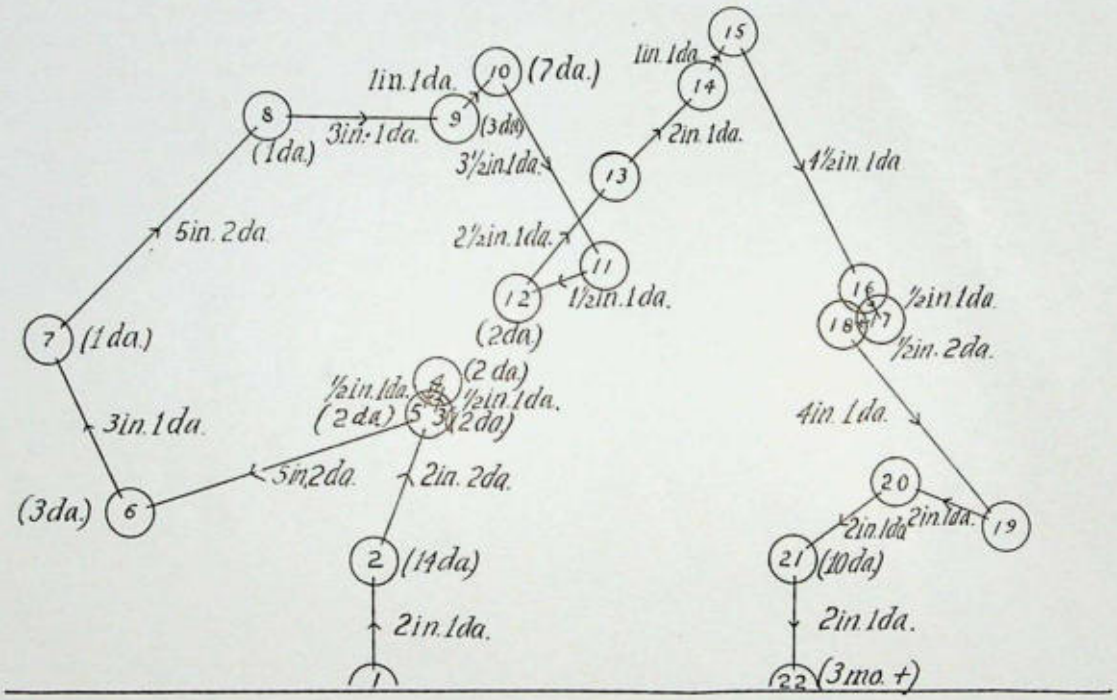


CHART OF MOVEMENTS OF WHITE-ARMED ANEMONE

to remain quiet, is a problem for which no solution suggests itself. The particular specimen forming the subject of this article was a good sized, white-armed anemone (*Sagartia leucolena*) which, with others of its kind, was kept in a balanced aquarium at the New York Aquarium. The receptacle was a twelve-gallon, straightsided, cylindrical glass jar about thirteen inches in height. The specimen was under observation for about twenty-four weeks altogether, during which time it pursued a very devious course about the dark side of the jar, often resting for days at a time, seldom continuing long in one direction, and getting nowhere in particular at the end.

The writer had often noticed that the specimens in the jars would occasionally change their positions, but it first occurred to him to study and plot their movements when it was noticed that this particular anemone had, from one day to the next, removed from the bottom of the jar, where it had been quietly reposing for some weeks (see No. 1 in the accompanying chart), and had crept a couple of inches up the side of the jar. This position was at once marked (No. 2). The desire for change was apparently satisfied for a time and the animal remained here for two weeks. About when the observer began to conclude that it would take at least the remainder of his natural life to get anything out of such a study, the anemone moved again about two inches, consuming two whole days on the road (No. 3). Here it again remained for twelve days. It then moved to No 4—less than the width of its base—in one day and spent two more days at rest. For some unaccountable reason it then retraced its journey to the exact position of the previous starting place (Nos. 3 and 5), where it spent two more days.

The little animal now covered about five inches in two days of apparently continuous travel to position No. 6. Three days of rest followed this and the wanderer again set out in a new direction and in one day of very active travel made about three inches to No. 7. Here it rested for a day and then moved a little more than five inches in two days to No. 8. After a day of rest at this point it travelled three inches further in one day to No. 9. Apparently exhausted by this unprecedented burst of speed it remained at this place for two days to recuperate when it again shifted its position one inch to No. 10.

The base now rounded up as though the animal intended to remain in this position, but at the end of a week an attack of unusual activity seized it. Three and a half inches of travel in one day brought it to No. 11. The next day it set out again, in a new direction, and arrived at No. 12, one and a half inches. Remaining here two days, it again altered its



A MIGRATING WHITE-ARMED ANEMONE
Note the ring of mucus left behind.

direction and traveled two and a half inches to No. 13; the following day it proceeded two inches further to No. 14, the next day to No. 15.

Without any rest the rambler now broke all records and travelled four and a half inches in one day, the longest single day's journey it made during the period of observation (No. 16). The following day's work resulted in only half an inch (No. 17) and two days were consumed in making the next half inch to No. 18. Another long trek followed this when four inches were made in one day to No. 19, and on the following day it nearly reversed its direction and made two more inches to No. 20. Again altering the direction the anemone travelled during the next day about two inches further to No. 21, where it rested for 10 days.

The next move was wholly unexpected from such an energetic tourist, for in one day it moved downward two inches to the bottom of the tank (No. 22), at a distance of about six and one half inches from its original starting point. Apparently satisfied with the results of its wanderings—though it is difficult to see what advantage had been gained by the procedure—it now settled down and remained in this position for three months, when the observations were terminated.

The entire distance traversed was about forty-eight inches and eighty-two days were occupied by the journey. Of this time, however, only twenty-four days were actually consumed in travel; the remaining fifty-eight being spent in resting at various stopping-places along the way—a leisurely journey surely.

It will be seen that the average distance covered by its travels during these twenty-four days of actual progress was two inches per day. The shortest distance it was observed to move during any one day was about half an inch and the greatest single day's journey four and a half inches.

In the course of its meanderings this anemone progressed from the bottom of the jar nearly to the top, the actual vertical distance being ten and a quarter inches, while the total distance from side to side was fifteen and one quarter inches, or nearly one-third the circumference of the jar.

The course was confined entirely to the side of the jar away from the light, though why this was the case is not evident since anemones are frequently found on the light side of this same jar. The direction of travel was altered decidedly not less than fourteen times during the course of twenty-one moves. As the anemone has radial symmetry, and, therefore, no head, it is not necessary for it to turn around before starting off in a new direction, but the foot or base seems merely to elongate in the direction of travel.

The motion is accomplished by the muscular action of the adhesive base. There are no definite muscles in this organ, which usually serves merely to attach the animal to the substratum, but there are muscle cells and it is probably by an undulatory motion of these that locomotion is accomplished. Apparently no portion of the base was removed from the glass.

When the animal is stationary for any length of time the base becomes more or less circular in outline, but in traveling it is somewhat irregular in form and elongates in the direction of travel. When starting out to travel from the resting condition, a rounded lobe appears on that side of the base in the direction of travel, and sometimes several of these lobes appear in various positions as though the animal were attempting to start off in several directions at once. In such a case it was not possible to observe why one of these lobes, rather than another, should indicate the direction finally selected. When the direction of travel is changed without entering the resting condition, a portion of the base is extended in the new direction and gradually the whole foot becomes extended along the new line.

If the sea-anemone remains stationary, even for a day, a ring of thick mucus is secreted around the edge of the base and a thin layer underneath. When the animal moves away this substance is left behind and may

remain visible for days and even weeks, upon the glass.

In making these observations no attempt was made to record the exact rate of progress within a given length of time, nor was any effort made to discover whether the distances covered were actually continuous, or were interrupted by shorter periods of inactivity.

The stations indicated on the chart were recorded at noon of each day when any movement was observed. No observations were made at night, but the position of the specimen was examined the first thing in the morning and the last thing in the afternoon. The records for Sundays were made by the employee in charge of the aquarium for the day.

The common brown anemone (*Metridium marginatum*) and the small striped anemone (*Sagartia luciae*), both of which are commonly kept at the aquarium, are known to have similar powers of locomotion, though they seem to move more slowly and less frequently. Professor C. W. Hargitt informs me that the white-armed anemone, the subject of this paper, is one of the most active of all the migratory anemones. It would be interesting to make a comparative study of the migrations of our three common species, but, judging by the leisurely movements of this, the most active species, a considerable amount of time and patience would be required. * * * *

Since the above was written the writer has had the opportunity to note the movements of two brown anemones (*Metridium marginatum*) in the same jar, and, so far as could be determined, under the same conditions as the white-armed anemone whose movements are discussed above.

The first of these was about an inch across the base, or twice the diameter of the white-armed anemone. Its position was noted on April 7 when it was about six inches above the bottom of the jar. The following table will show the amount of travel:

Position	Distance traveled	Date
1		April 7
2	1½ in.	" 8
3	1⅛ "	" 9
4	½ "	" 15
5	⅝ "	" 18
6	⅜ "	" 22
7	⅞ "	May 25
8	¾ "	June 1
9	1 "	" 22
10	⅝ "	" 26

After the last move the animal remained only a few hours, when it let go of the glass and fell to the bottom, a distance of about 7 inches, alighting on one side. Here, after a couple of hours spent in righting itself, it moved a short distance to a pebble where it has remained ever since apparently quite contented with its surroundings.

As shown by the above table the longest journey was only 1½ inches. As in the case of the white-armed anemone the wanderings were devious, every new move being at a sharp angle from the preceding. As a result, during the ten emigrations which covered a total distance of 7⅜ inches and consumed, with periods of rest, 80 days, the animal was at no time more than 2½ inches from its starting point at No. 1. The only time it succeeded in getting anywhere was when it let go and fell to the bottom.

The second brown anemone studied was larger, about 2 inches across the base. When first noted it had just moved from a pebble to the side of the jar at the bottom. It did not move up the glass like the others, but traveled in straight lines back and forth with a portion of its foot in contact with the bottom.

The table gives the distances and dates of the various moves:

Position	Distance	Date
1		June 3
2	1¼ in.	" 6
3	5½ "	" 8
4	1 "	" 13
5	1¼ "	" 15
6	1¼ "	" 16

The next day, June 17, the anemone left the glass and moved to a pebble where it has been ever since.

The first two moves were to the right totaling 6¾ inches. The direction was then reversed and the animal continued toward the left until it moved away from the glass. The longest single days journey was 5½ inches. This distance does not seem great, however, when we consider that this anemone stretched itself out in the direction of travel until its base was 2½ inches long. The total distance traveled in the five moves was 10¼ inches, an average of slightly more than 2 inches per journey. The average distance traveled on days when any activity was noted was therefore about the same for this large brown anemone as for the much smaller white-armed anemone, though perhaps the number of moves made by the former is too small to afford a safe comparison.



YOUNG ANTARCTIC ELEPHANT SEALS IN THE HAGENBECK COLLECTION

ZOOLOGICAL INVESTIGATIONS AT THE AQUARIUM.

AT the request of the United States Bureau of Fisheries, the Director of the Aquarium has provided space in the Aquarium laboratory for an investigator of the Bureau, who will at once begin experiments with a view to determining the best and most nutritious foods for fishes and young fry reared in hatcheries. Dr. S. Morgulis, a specialist in nutrition research, has been engaged for the work. He has made preliminary studies at the Woods Hole Laboratory, but neither that laboratory nor any of the other stations of the Bureau afford proper facilities for such work. This is an unexplored field of research and should yield practical results of value not only to fish culturists but to the Aquarium. The studies are being made at the expense of the Bureau, the Aquarium contributing tanks and an assistant.

It has always been the policy of the Zoological Society to encourage such investigations and the small laboratory of the Aquarium has often been placed at the service of biologists.

The space available for laboratory work is so limited that the Aquarium has suffered in consequence.

Dr. W. H. Bates of the College of Physicians and Surgeons has been at the Aquarium for some weeks, studying the eyes of fishes, and contributes some of the results of his experiments to this number of the BULLETIN.

Dr. G. A. MacCallum of the College of Physicians and Surgeons continues to examine all fishes which die at the Aquarium. His reports will eventually supply valuable information on the causes of death among fishes.

Dr. George S. Huntington, Prosector of the Zoological Society, and his assistant, Dr. H. von W. Schulte, of the College of Physicians and Surgeons, continue to examine and report upon all specimens other than fishes which die at the Aquarium.

One of the needs of this institution is a large and well equipped laboratory such as can never be afforded in the present crowded building.

C. H. T.

European Zoos in Wartime.—A great war affects all civilization to some extent, while its effects in the countries actually engaged, may be altogether disastrous to enterprisises of world wide interest.

As this BULLETIN goes to press the newspapers describe the sad fate which is overtaking the famous Hagenbeck wild animal gardens at Hamburg. As the supply of meat fails, the herbivorous animals are being slaughtered in the hope of saving, temporarily at least, the more valuable carnivora.

It is stated that many of the keepers have been called for military service and that two of the brothers Hagenbeck may have already lost their lives.

Early in the summer Mr. Lorenz Hagenbeck visited the New York Aquarium and presented the photograph of young Antarctic elephant seals in the great Hagenbeck collection, which is published herewith. It will be interesting for comparison with photographs of young northern elephant seals formerly exhibited at the Aquarium and published in the BULLETIN for May, 1911.

The Aquarium supplied Mr. Hagenbeck with several species of American turtles in exchange for European species, and had the promise of specimens of the "walking fish" (*Periophthalmus*) of the East Indies as soon as they could be secured.

The Hagenbeck institution is well known to travellers, and is appreciated by zoological societies throughout the world.

C. H. T.

ZOOLOGICAL SOCIETY BULLETIN

Departments:

Mammals
W. T. Hornaday.

Aquarium
C. H. Townsend.
Raymond C. Osburn.

Birds
C. William Beebe.
Lee S. Crandall.

Reptiles
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Elwin R. Sanborn,
Editor and Official Photographer

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A NEW SPECIES OF ANGEL-FISH.

Under the title "A New Angel-Fish (*Angelichthys townsendi*) from Key West" a description of this new species has recently been published by Mr. John T. Nichols of the American Museum of Natural History and Mr. L. L. Mowbray of the New York Aquarium (Bull. Am. Mus. Nat. Hist., vol. 33, article 37, pp. 581-583, Oct. 8, 1914). The specific name is proposed "in appreciation of the untiring efforts of Dr. Chas. H. Townsend, Director of the Aquarium, to show beautiful coral-reef fishes to the public."

The species was first noticed when a single specimen was brought to the Aquarium from Key West in June, 1914. This fish lived only a couple of weeks, but later two more were brought from the same locality, one of which is still on exhibition. Only two other species of this genus have hitherto been known from the West Indies and Florida and a third from the Galapagos Islands in the Pacific Ocean.

Messrs. Nichols and Mowbray also called attention in this same paper to the fact that the common blue angel-fish of Bermuda and Florida has long been wrongly identified as *A. ciliaris*, whereas it should be *A. isabellita*.... *A. ciliaris* does not occur at Bermuda and is apparently rare in Florida waters as only three specimens have appeared in our collections from that region. It is not to be wondered at that the species have been confused, and this new species has so long remained unnoticed, for there is a great amount of variation in both form and coloration in specimens of different ages, but Nichols and Mowbray have had smaller and larger specimens of all three species for comparison. All past notices of angel-fishes at the Aquarium should be referred to *A. isabellita*.

R. C. O.

LOCAL AQUARIUM SOCIETIES.

The aquarium societies of New York and Brooklyn, which draw their membership chiefly from among those who are interested in the small household aquarium and its inhabitants, continue to thrive, if one may judge from their activities. The Brooklyn society recently held its annual exhibition at the Brooklyn Museum, September 25 to 27, and the display of beautiful and interesting small aquarium fishes together with other aquatic animals attracted much attention. The New York Aquarium exhibited a balanced salt water aquarium, stocked with sea-anemones and other marine forms.

The New York Society will hold its annual exhibition at the American Museum of Natural History, October 15 to 18, and considerably more than a hundred entries have been made.

These exhibitions always draw large numbers of visitors, the greater portion of whom are not mere sight-seers but are interested in the displays of aquatic life. The most remarkable feature about these exhibitions is the large number of small exotic fishes from all parts of the world, but mostly from the tropics, that are to be seen in the collections of private fish fanciers. The half-moon fish, from the upper Amazon, which was so rare a couple of years ago that $50 was no unusual price for a pair of these fishes, is now not uncommon in private aquaria, and was well represented at the recent show of the Brooklyn society. Many of these fanciers are also expert breeders of the goldfish in its many varieties and highly bred fishes often compete closely for the premiums.

R. C. O.

BELMONT PARK PLANTS.

The Zoological Society has come into tentative possession of a number of rare and costly palms and other plants, through the courtesy of the President, Treasurer, and Directors of the Turf and Field Club. This celebrated collection of plants has been removed from "Oatlands," the old Manice manor house, Queens, Long Island, and placed on deposit at the Zoological Park. Madison Grant, Esq., one of the Governors of the Club, whose mother is the last of the older generation of the Manice family, secured the collection for the Society.

BOARD OF MANAGERS.

At a meeting of the Executive Committee held on October 1, Mr. Henry M. Tilford was elected a member of the Board of Managers, class of 1915, to fill the vacancy caused by the death of the late Mr. John L. Cadwalader.



OCTOPUS IN THE HONOLULU AQUARIUM
Climbing up the glass front of the tank.

Interesting Pictures of the Octopus.—The frontispiece of this BULLETIN, showing the octopus, is from a photograph made in the New York Aquarium. It shows this interesting animal climbing up the side of the tank. Our attempts at photographing the octopus have not hitherto been very successful owing to the weakened condition in which such specimens are usually received from Bermuda. This photograph by Mr. I. P. Gillette, was secured immediately after the arrival of the last specimen received at the Aquarium, and is reproduced by courtesy of the International News Service.

This octopus lived no longer than other specimens received previously—only a few days.

The octopus endures captivity very well in such aquariums as those at Naples or Bermuda, where it can be procured from adjacent waters. Our experiments have shown pretty conclusively that it cannot survive transportation for long distances.

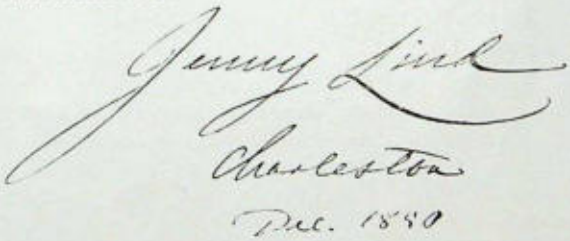
The smaller octopus picture is from the Honolulu Aquarium and shows the animal climbing up the glass front of the tank.

The Aquarium Poster Stamp.—The New York Aquarium, with two millions of visitors a year, and not really in need of advertising, is nevertheless using an advertising stamp. Poster stamps for advertising have been in common use in Europe for some time, and we may expect them to become so here. Pasted on the backs of letters, these highly colored little advertisements are carried far and wide. The collecting of miniature posters is already a fad abroad and this is not to be wondered at, as many of them are remarkably well designed.

The Aquarium poster stamp was suggested by one of the photographs taken by Mr. Sanborn during the Zoological Society's porpoise hunting expedition last year to Cape Hatteras. Visitors to the Aquarium appear to be willing to take these stamps at one cent each.

Jenny Lind Autograph.—The Aquarium Library has secured an autograph of Jenny Lind who in 1850 sang many times in the Aquarium building, then called Castle Garden. It is reproduced here as an item of interest, connected with the history of the building which is now over 100 years old.

The autograph was obtained from Miss Julia Merritt, daughter of the gentleman to whom it was addressed.



The Porpoise.—The bottle-nose porpoise (*Tursiops truncatus*) at the Aquarium is still lively and playful after eleven months of captivity. It is tireless in its activity, moving about the pool in various directions day and night, sometimes racing at high speed or leaping clear of the surface many times in succession. Not infrequently it swims belly up, noisily smacking the surface of the water with the tail.





YELLOW GRUNT
The pupil is nearly round.

FISHES' EYES.

By W. H. Bates, M.D.
(Photographs by Elwin R. Sanborn.)

THE Aquarium is one of the show places of New York. Here are gathered several thousand fishes so arranged that they can be readily inspected while swimming in the tanks. The crowds of people that visit the place daily, testify to the fact that here is something worth seeing.

Some children were taken to the Aquarium and were asked to tell what they saw of the eyes of the fish. One boy eleven years old, said, "the pike has an eyeball shaped like an egg and their eyes seemed to be staring at you when you looked at them." "The muskallunge has eyes which go in and out; they are bright with a yellow ring around them." The rainbow trout appeared to him to have an eyeball shaped something like a square, the eyes of the yellow perch bulged at the top. He noted the turquoise blue of the eye of the red hind. Both he and his sister, aged seven, after two hours did not want to leave.

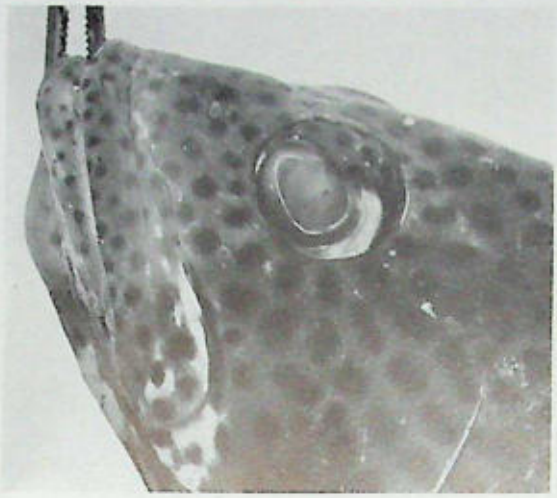
The eyes of the fish are in constant use except when they are asleep. They move up, down, to the right or left and rotate. In some fish these movements are quite marked. Fish have large eyes relatively to man. The width of the eyeball from side to side, is usually much greater than its depth. A fish ten inches long usually has eyeballs about one-half of an inch long, while a man seventy inches tall has spherical eyeballs about one inch long. One may say that the eye of a fish is one-twentieth of its length, while that of a man is occasionally only one-sixtieth or one seventieth of his height. However, the black grouper has very large eyes. In one specimen three feet long, the eyes were nearly two inches wide. A nurse shark of about the same length had eyes less than one-quarter of an inch wide. Eels four feet long had eyes as small as those of the shark.

My first impression of the fish seen in the tanks of the New York Aquarium was that their eyes seemed very open. Why? After investigation it was found that most of them had no eyelids. As their eyes need protection, was there anything else to save them from injury? Most fish have their eyes protected by a slimy material. The eyes of the red hind, yellow grunt and others have a transparent skin over the front part of their eyes, which is as thick as the skin of the fish or as the eyelids of some animals which live on the land. In the herring, this transparent skin covers only a part of the eye. Exposure to the air was soon followed by a cloudiness of the transparent coat of the eye so that in a few minutes, or less, the interior of the eye could not be seen with an instrument called the opthalmoscope. The puffer, or swell fish, living in salt water, has eyelids which cover the eyeball when closed. The lower eyelid is much larger than the upper, being the reverse of the condition found in man, whose upper lid is larger than the lower.

Mr. L. L. Mowbray, of the Aquarium staff, suggested that the puffer needed eyelids for the protection of its eyes because of its habit of burrowing in the sand at the bottom of the water.



YELLOW GRUNT
Enucleated eyeball held by forceps. The skin covering the front of the eyeball has not been removed.



RED HIND

Note the pear shaped pupil. The outer skin of the eyeball is pigmented above, transparent where it passes over the cornea and pupil and becomes opaque and less pigmented below.

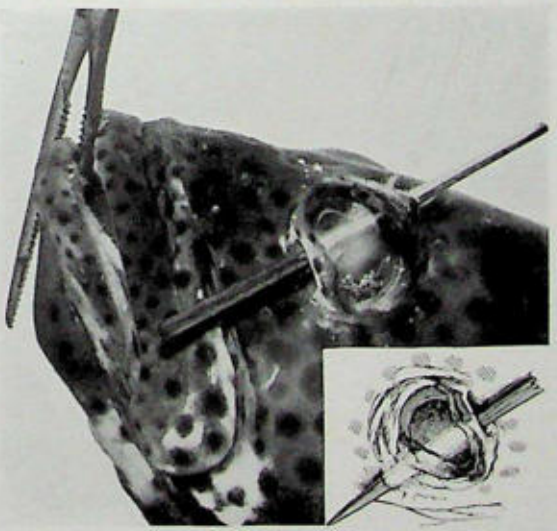
The colored portion of the eye, the iris, is usually yellow in color. However, one found fish with the iris of different colors. In the center appears the black part called the pupil, usually round, as in man; but, fish were found whose pupils were pear-shaped, triangular, oval and pointed at each end. The size of the pupil does not appear to change very much on exposure to a bright light or as rapidly as does the pupil of most air-breathing animals. When the light comes from behind the observer, the interior of the eyes of the fish show beautiful colors; shades of red, yellow, blue and green. Many visitors at the Aquarium were entertained for a long time by the wonderful variety and kaleidoscopic changes of colors in the eyes of the fish. Dr. C. H. Townsend has published in one of the reports of the Zoological Society a valuable and interesting paper on the changes in the color of fish.

Have Fish Good Eyesight?

The men connected with the Aquarium have told me some interesting stories of their wonderful power of vision; and, one can believe that fish do see well when they avoid obstruction in their paths while darting rapidly through the water.

The object of the study of fishes' eyes was to find out the cause of near-sight and the need of glasses acquired by school children. The facts learned were of great practical value. One theory of the cause of myopia or near-sight was that muscle inside the eye, called the ciliary muscle, produced near sightedness. This theory was not the truth in the case of fish, because they have no ciliary muscle. Another theory was that the near use of the eyes caused myopia or near-sight. This theory did not apply to fish because myopia or near-sight was not found in fish like eels that habitually use their eye for near objects. Near-sight or myopia was produced in fish by the action of two muscles outside of the eyeball, called the superior and inferior oblique. They are so arranged about the eyeball that they form a nearly complete belt. When these muscles contract, the belt is tightened and consequently the eyeball is squeezed out of its normal shape, just as one would change the shape of a hollow rubber ball by squeezing it when held in the hand. The line or axis of vision becomes elongated. The elongated eyeball like the photographic camera with the bellows elongated is focussed for near objects.

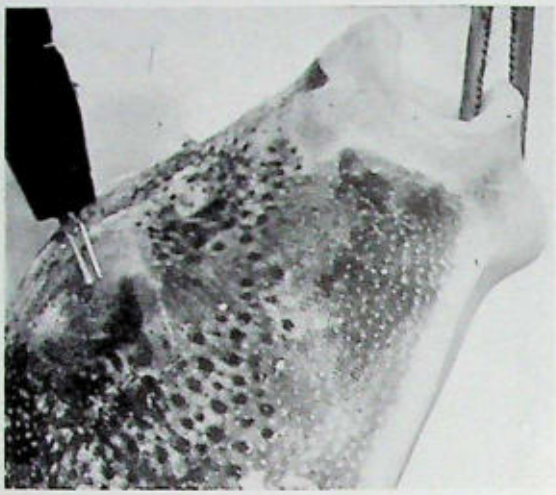
With the aid of an instrument called the retinoscope, which reflects the beam of an electric light into the pupils of the eyes of the fish, it was determined positively that all the fish examined while they were swimming in the tanks, several hundred individuals of many species, were neither near-sighted nor did they have astigmatism. Their eyes were nearly normal and were usually focussed accurately to see distant objects. The eyes of decapitated or dead



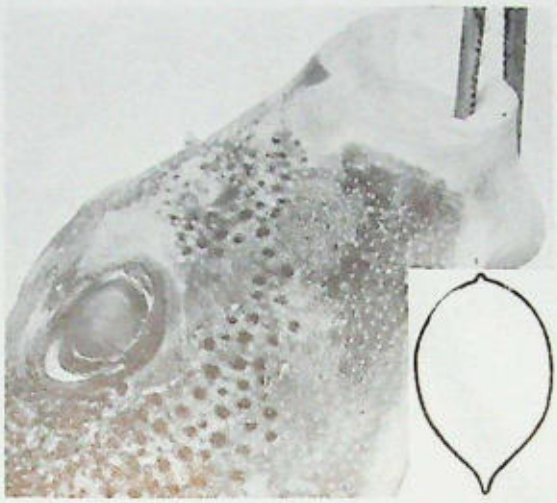
RED HIND

A probe has been inserted between the outer skin of the eyeball and the globe. A part of the pupil can be seen.

Diagram—Red hind showing the transparent membrane covering the front of the eye with a probe beneath it. Note the pear shaped pupil.



PUFFER
The eyelids are closed by electrical stimulation.



PUFFER
The eye is open. Note the oval pupil.
Diagram—The shape of the pupil of the eye of the Puffer.

fish were normal, as were the eyes of fish that were asleep from the effects of ether. When examined out of the water or in the air, the eyes were the same as when the fish were immersed; but, in a short time, less than a minute, one could not see the interior of their eyes. Good photographs of the eyes could only be obtained while the fish were immersed. The fact that fish are not near-sighted should be emphasized because some writers have stated that fish have their eyes focussed for near objects most of the time. Fish, while able to see, or to focus their eyes correctly for distant objects, are also able to change their focus and see near objects. Some fish were observed with the aid of the retinoscope that had their eyes properly focussed on objects as close as four inches or even less.

How do Fishes Change the Focus of Their Eyes.

Fishes' eyes are adjusted to see near objects by the squeeze or contraction of the two oblique muscles on the outside of their eyeballs. The squeeze of the oblique muscles makes the eyeballs longer, the condition found in near-sight. To see distant objects accurately, these muscles relaxed, which permitted the eyes to resume their normal shape. The following experiment demonstrates that the accommodation or the near focus of fishes' eyes is produced by the action of the oblique muscles and not by the action of the ciliary or any other eye muscle:

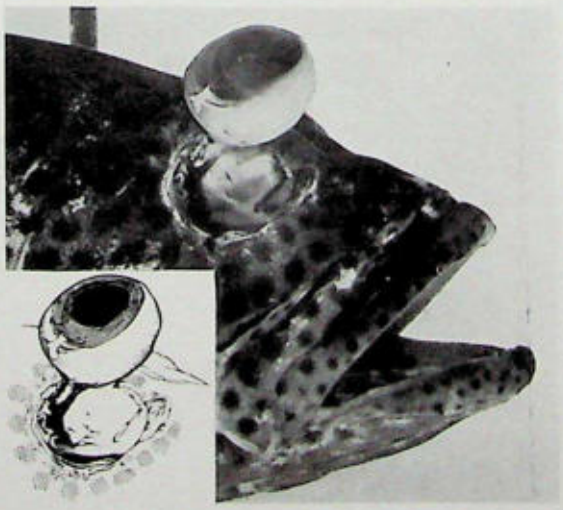
1. In the beginning the eye of a normal fish was examined.

2. By means of electrical stimulation applied to the eyeball or its neighborhood, in most fish their focus was changed from distant to near objects.

3. One of the muscles of the eye called the superior oblique, was cut, which produced no change in the focus of the eye.

4. Electrical stimulation now did not produce any change in the focus. It did not accommodate.

5. The muscle which had been cut was now re-united with a thread, sewed together, with-



RED HIND
The outer skin of the eyeball has been peeled off and the eye muscles removed. The eyeball is held only by the optic nerve which appears as a white cord.
Diagram—Red hind, right eye with muscles removed and skin over the front of the eye peeled off. Note the shape of the eyeball, wider from side to side than at the optic axis.



PUFFER

i. o. Inferior Oblique, one of the two muscles of accommodation.

i. r. Inferior Rectus, the muscle which turns the eyeball downwards.



PUFFER

s. o. Superior Oblique, one of the two muscles of accommodation.

s. r. Superior Rectus, the muscle which turns the eyeball upwards.

out producing any change in the focus of the eyes of the fish.

6. Electrical stimulation now changed the focus from distant to near objects, as it did in the beginning.

It was interesting to observe that in those fish which did not have two oblique muscles, electrical stimulation failed to change the focus of their eyes from the distance to a near point. In one, the dog fish, with one oblique muscle, accommodation or near focus was not produced by electrical stimulation; but, after the place of the absent muscle was supplied by a thread of silk, then the focus of dog fish's eyes was changed to a near point when they were stimulated with electricity. After the oblique muscles were removed from the eye of a fish and when the eye had healed, some weeks later, near focus or accommodation could not be produced by electrical stimulation.



DIAGRAM OF HUMAN EYE

One inch long from a person, 60 inches tall. Note the nearly spherical shape. The optic nerve entrance is at the inner side.

In another series of experiments, the lens of a fish's eye was removed. A pearl roach six inches long was examined. The eyes were not near-sighted. Electrical stimulation produced considerable change and the eyes were focussed for a near point. The lens of the eye was pushed to one side of the axis of vision, when the eye became very far-sighted. Electrical stimulation of the eye now produced marked accommodation. This experiment confirmed others that the lens was not necessary to change the focus from distant objects to those which were near. While I was otherwise engaged, Dr. C. Barnert performed the same experiment successfully on the eye of a carp. He pushed the lens to one side, applied the electric current, and produced near-sight or accommodation in a few minutes, all without assistance. Electrical stimulation produced as much accommodation after the removal of the lens as before. The fact that accommodation in the eyes of fish is not produced by the action of the lens inside of the eyes, but is accomplished by the two oblique muscles outside of the eyes, is one of great practical value. The investigations further showed that fish could be made near-sighted, far-sighted or astigmatic by various operations upon the oblique muscles.

Of what value was the study of fishes' eyes to people with poor sight wearing glasses? In brief, the *cause* of the need of glasses was learned and it suggested treatment successful in relieving near-sight, far-sight, astigmatism and presbyopia or old age sight without glasses.



THE BLUE CRAB IN SWIMMING POSITION
Note oar-like hinder legs used for this purpose.

SOME FACTS ABOUT THE BLUE CRAB.

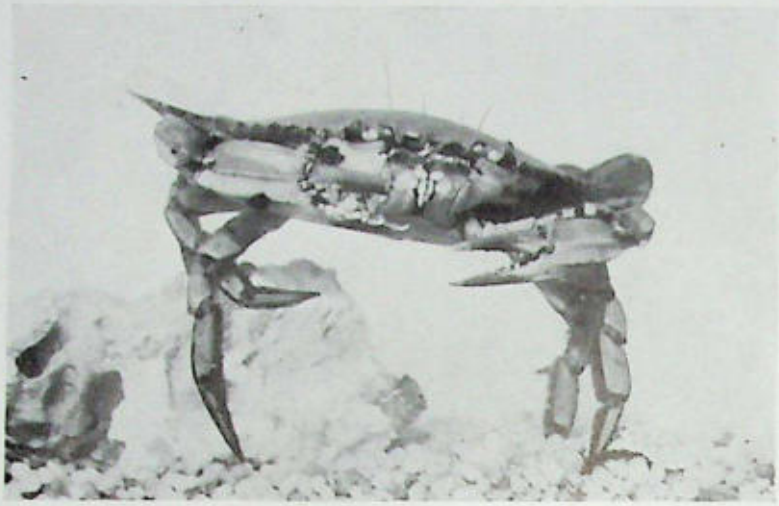
By R. C. Osburn.

THE common edible crab is too well known to the readers of the Bulletin to require a detailed description, but there are a number of interesting structural features which the casual observer may overlook and some things with regard to its life history with which the average reader may not be acquainted.

There are altogether nine species of the genus to which the blue crab belongs and they are distributed around both coasts of North and South America and on the Atlantic coast of Africa. The only species found in the middle Atlantic states is *Callinectes sapidus* Rathbun, which forms the subject of this article. The name of the genus Callinectes means "beautiful swimmer." Probably no one but an enthusiastic carcinologist, or expert on the Crustacea, would think of calling any crab beautiful, though the adult blue crab certainly has fine colors. The name cannot by any means apply to its manner of swimming, for, while it swims actively for a crab, its movements can scarcely be called graceful. In comparison with other crabs, and viewed from the standpoint of the naturalist, however, the genus is certainly a fine one. The specific name *sapidus* is strictly applicable, as every lover of sea foods will testify.

The blue crab ranges all along our coast from Massachusetts Bay to Brazil and is very abundant in the region about New York City. It is not deterred from entering the harbor by the polluted condition of the water nor prevented by the brackish nature of the river from going some miles up the Hudson. In fact it has been found in fresh water as far up as Newburg. It enters all the little inlets and passages and frequents the open shore as well, but it is rather partial to muddy bottoms.

The crab fishery is a very important business in the middle Atlantic states as the following figures, taken from the census report of the Fisheries of the United States for 1908 will show. The states principally engaged in the industries were in order of importance, Virginia, Maryland, New York and New Jersey, and the



GETTING READY TO RUN
The body is balanced on the three middle pairs of legs.

combined products of these states for that year reached the astonishing total of 46,103,000 pounds, worth to the fishermen the neat sum of $670,000. Virginia headed the list with a production of 25,083,000 pounds, while Maryland was not far behind with 20,373,000 pounds; but New York and New Jersey yielded only 602,000 and 345,000 pounds respectively.

The number of crabs of this species marketed is very difficult to estimate, as so many are sold locally to seaside hotels and restaurants as well as to individuals. This condition obtains especially in the region about New York City, where the great summer population of the seaside resorts consumes enormous numbers of these crabs, no record of which is taken.

The crabbing industry is thus one of the most important fisheries of these states, being surpassed by only the following named in the order of importance; oysters, menhaden, shad, hard clams, bluefish and weakfish.

The crab fisherman is one of the most familiar sights all summer long on every bridge and pier, and any one may indulge in the sport, if one may stretch that term to cover crabbing, for there are no sex or age limits.

It requires no special ingenuity to capture crabs, perhaps that is why so many people take a hand at it. A piece of overripe meat for bait and one of the many kinds of traps on the market, and the insatiable appetite of the crab does the rest. All one has to do is to throw the trap in and haul it up occasionally and one fisherman can run several traps at a time. As a sport, this can scarcely be ranked with tuna fishing or angling for trout. Unless you are provided with a pair of crab tongs, however, there is a certain amount of excitement in getting your crab after you have caught him, for pugnacity is one of his strong points and his pincers are weapons to be avoided. He can be handled most safely by one of his oar-like hind legs, which are out of reach of the wide sweep of his claws, and the thoroughly initiated crabber may grasp him by the back of his shell with safety.

The blue crab is not at all particular as to his diet, and any thing alive or dead in the way of animal food is acceptable. Fish form a large portion and are often taken alive. The crab hides in the mud at the bottom, burrowing rapidly by backing into the mud until only his eyes and antennae are visible. If the unwary small fish passes too close, the strong chelae make a quick grab and the fish comes to an untimely end. The dexterity with which the crab handles these awkward-looking weapons is remarkable.

The usual manner of catching crabs for commercial purposes is by means of dredges, nearly half of those marketed being taken in this manner. They are also captured by means of pots, traps of various sorts, as well as in gill nets, pounds nets, seines and on lines.

Crabs are marketed either as "soft shells" or "hard shells." Many persons believe these to be different kinds of crabs, but they are in reality only different conditions of the same species. When hard shells are taken which show no signs of shedding or moulting the shells, they are marketed in this condition. When the adult crab is about to moult, this is made evident some days before the event takes place, by certain indications well known to the fishermen. The first evidence that the moult is about to occur is "a narrow white line which appears just within the thin margin of the last two joints of the posterior pair of legs. Within three or four days the white line gives way to an equally narrow and obscure red line and a set of fine white wrinkles makes its appearance on the blue skin between the wrist and the upper arm. Such a crab is known as a "peeler" and may confidently be expected to cast its shell within a few hours." (Prof. W. P. Hay, The

Life History of the Blue Crab, Report of the Bureau of Fisheries, 1904, p. 11.)

When the process of casting off the skin actually begins, a crack appears in the shell around the sides and back, so that the upper part of the shell or carapace can be lifted up like a lid. Then the crab begins to back out of the old shell, freeing first the hinder legs and then the others forward successively until only the large pincers remain. On account of their size the withdrawal of these members is a much more serious process and could scarcely take place at all but for the fact that certain portions of the hard shell of the narrow constricted bases of the legs break away or become softened for the purpose. The whole process lasts ordinarily only a few minutes.



READY FOR A FIGHT

The large pincers are in position to strike and the eyes project from beneath the carapace.

The crab grows very rapidly by absorption of water during this process and for a short time afterward, so that after shedding it will measure nearly one fourth larger. As the crab is defenceless and comparatively helpless in the soft state, it attempts to hide away during the process of shedding and remains secluded until the new shell has hardened, which takes only two or three days.

As soft shelled crabs bring several times as much on the market as the hard shells, the fishermen are keen to observe the signs of "shedders" as those which are about to moult are called. Such crabs are put aside and held in pounds until they shed and can be marketed as soft shells.

This crab illustrates in a remarkable manner by its fifth or hinder pair of limbs how an organ may be modified in adaptation to different uses. If we go back far enough in the racial history of the Crustacea we find forms in which all eight pairs of the thoracic legs are adapted for swimming, as, for example, in the *Mysis* shrimp. Later in the evolution of the crabs, the three anterior pairs of thoracic legs became changed into mouth parts while the hinder five pairs were all fitted for walking. The majority of the crabs have remained in this condition and except in the larval stages are unable to swim. Certain members of the group, however, and the blue crab among them, have undergone a still further change, in which the fifth or hinder pair of walking legs became formed like a pair of oars. With this new arrangement the blue crab is able to swim in a somewhat cumbersome fashion so that it is no longer compelled to spend its life at the bottom, even though it chooses to do so most of the time. Some crabs with this endowment have even gone back to the surface of the sea to live, as for example, the gulf-weed crabs which live among the *Sargassum* floating at the surface over the wide oceans.

In walking or running the blue crab uses only the three middle pairs of thoracic legs, for the oar-like hinder pair is held up out of the way and the big pincers, which constitute the first pair, are also raised. But let no one suppose that this reduction in the number of limbs used in walking interfers with speed, for the blue crab can make better time on land than most crabs which use four or all five pairs of thoracic legs for this purpose. To be sure he is not as agile as the ghost crab (*Ocypoda*) of our southern shores which can give the average man a very good chase for a short distance, but, according to my own observations, he can make about a yard a second, which is one-tenth as fast as the fleetest sprinter.

Of coure this crab can walk forward or backward, but when he is in a hurry he always goes sidewise, and he has the big advantage that he can go to the right or left with equal rapidity. His legs have a longer stride in a sidewise direction and probably there is less danger of



CRABBERS AT WORK
Along an inlet on the south shore of Long Island, with box and folding traps.

getting them tangled up. Morever, his body is pointed at the sides and thus there is much less resistance in this direction. Someone has suggested that the motto of the crab should be "be sure you're right and go sideways for all you're worth" and certain persons, probably not zoologists, have spoken slightingly with regard to this lateral progression of the crab, as though he were not advancing as the result of his labors. Of this one thing we may be sure, the crab goes where he wants to go and wastes no time about it, which is perhaps more than can be truthfully said of some of his critics.

Like other higher crustaceans, the crab breathes by gills, which while morphologically outside of the body, have become enclosed by the projection of the shell so that they are completely covered and protected. The only openings left are those at the bases of the legs, where the water enters the gill chamber and at the anterior end of this chamber where the water, depleted of its oxygen and laden with carbonic acid gas, finds its exit. The gills are outgrowths from the bases of the legs, in the form of complicated feathery structures, in which the colorless blood is exposed over a large area to the water in the gill chamber, with only a thin layer of tissue between. One of the interesting things about the manner of breathing is the fact that fresh water is not sucked or otherwise forced into the gill chambers, but instead is dipped out by the action of a peculiar spoonlike organ on the base of the third jaw-foot or maxilliped. These structures, of course, are arranged bilaterally, that is, one on each side of the body. This ladle, known technically as the scaphognathite, is kept in constant motion, dipping out the water so that a new supply containing oxygen may enter the gill chamber through the small openings in the shell at the bases of the legs. The openings of the ducts of the excretory glands are situated far forward on the bases of the large second antennae, and the current of the water from the gills carries away the products of these glands.

As has been stated, the pincers are not used in locomotion, but serve for capturing and rending the food and for self defense. The food broken off by the pincers is passed by them directly to the mouth parts and it is an interesting sight to watch these ungainly appendages during this operation. The mouth parts number six pairs, all of them jointed and working from side to side. The study of their origin proves that all of these were originally legs, three pairs of them belonging to the head region and three to the thorax. The most anterior is a pair of crushing organs, called mandibles, and behind these are two pairs of cutting implements, the maxillae. The three thoracic pairs of mouth parts, the maxillipeds (jaw feet) aid in holding and breaking up the food, while to the hinder one is attached a ladle for dipping out the water from the gill chamber. Another portion of this same pair takes the form of a broad expansion which can be closed over the other mouth parts like a pair of trap doors.

The body of the crab is so condensed, and abbreviated at the ends that at first glance it appears like a thorax running about minus the head and abdomen. A little closer scrutiny will show that the head is simply fused with the thorax after the fashion of the lobster only very much more so. Its position is indicated by the two pairs of antennae or feelers and the bright shining compound eyes, mounted on movable stalks. The later can be tucked away beneath the shell for protection, or protruded for purposes of observation.

The abdomen, which at first appears to be entirely lacking in the crab is found to be bent forward under the thorax, though to be sure,

some of the segments or joints are wanting. In the ancestors of the crabs the abdomen consists of seven joints, as we see in the lobster or crayfish to-day. In the male especially, the abdomen is greatly reduced and very narrow and is so closely applied to the under side of the thorax that it lies in a groove. The narrow posterior part of the intestine runs through these segments to open on the terminal joint. In the female the abdomen is much broader, for the reason that it still retains the function of protecting the eggs until they are hatched. For this purpose the abdominal legs or swimmerets, which in the crab have no other use, are well adapted for carrying the eggs, which are glued to them by a secretion from the oviduct just as in the lobster or crayfish.

It is interesting to note in this connection that the abdomen of the immature female crab is much narrower than in the adult, having a triangular form. The swimmerets also are very small and do not suggest their functions in the adult. It is only with the last moult before sexual maturity is reached that the broad abdomen with the large hairy, fully developed swimmerets, makes its appearance.

The eggs are very small, only about 1/100 of an inch in diameter and they are produced in such enormous numbers that it is estimated that a single female may lay the astonishing number of 3,000,000. There seems to be no very good evidence as to whether the female spawns more than once.

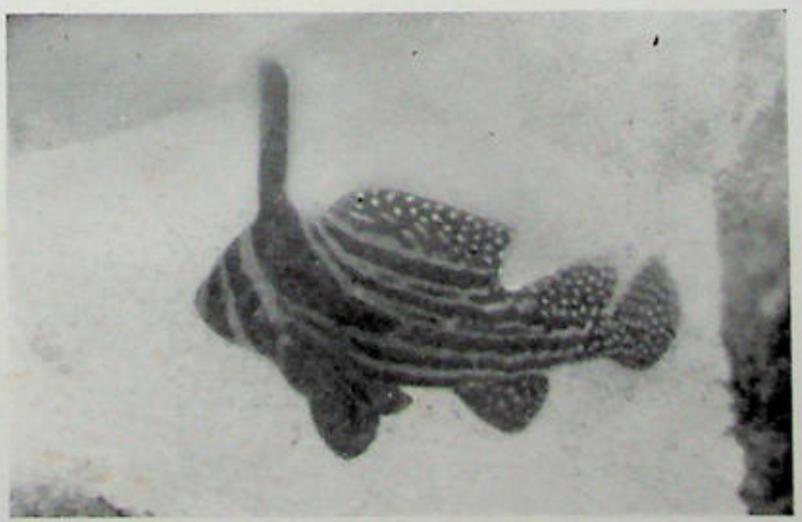
The newly hatched young has not the least resemblance to the adult, neither in appearance nor habits. It is a swimming larva, known as a zoea, living at the surface of the sea. It has a long abdomen of six joints, a high dorsal and lateral spines, eyes much out of proportion to the body, and it swims by means of three pairs of legs which later become the mandibles and maxillae. After a series of moults, the zoea takes on another form known as a megalops, from the large eyes. In this condition it still has little resemblance to a crab, but the thoracic legs are all developed and the abdomen somewhat reduced in proportion. The eyes at this time are monstrously large and stand out at the sides of the head on movable stalks. Finally after a sufficient number of moults, the form has gradually changed and the habits have undergone a similar modification. When at last the adult form is reached, the young crab sinks to the bottom and makes his way into shallow water in protected situations along the shore, where, among sea weeds or rocks, he finds his food and grows to maturity.

An Interesting Fish Photograph.—Among the wild fishes to be seen in the submarine motion pictures of the Williamson Expedition to the Bahamas, and now on exhibition in New York, is the Spotted Horse (*Eques punctatus*).

This is a West Indian species which is known chiefly from Cuba and Hayti. It does not appear from the literature at hand that this fish has even been figured, and it is interesting that it should have wandered within the range of the camera of the first expedition to undertake motion pictures under water. The pictures were made in a glass-fronted photographic chamber, specially constructed for this purpose. The expedition's barge with its submerged photographic apparatus was moved about to suitable points for submarine views. Most of the pictures were made at the Sea Gardens near Nassau Bahamas.

The BULLETIN is indebted to the Submarine Film Corporation for this enlargement from one of the films. *Eques punctatus* is a handsome fish with remarkably high dorsal fin. Many of the fishes shown in motion are species which may be seen at the New York Aquarium.

C. H. T.



THE SPOTTED HORSE (*EQUES PUNCTATUS*)

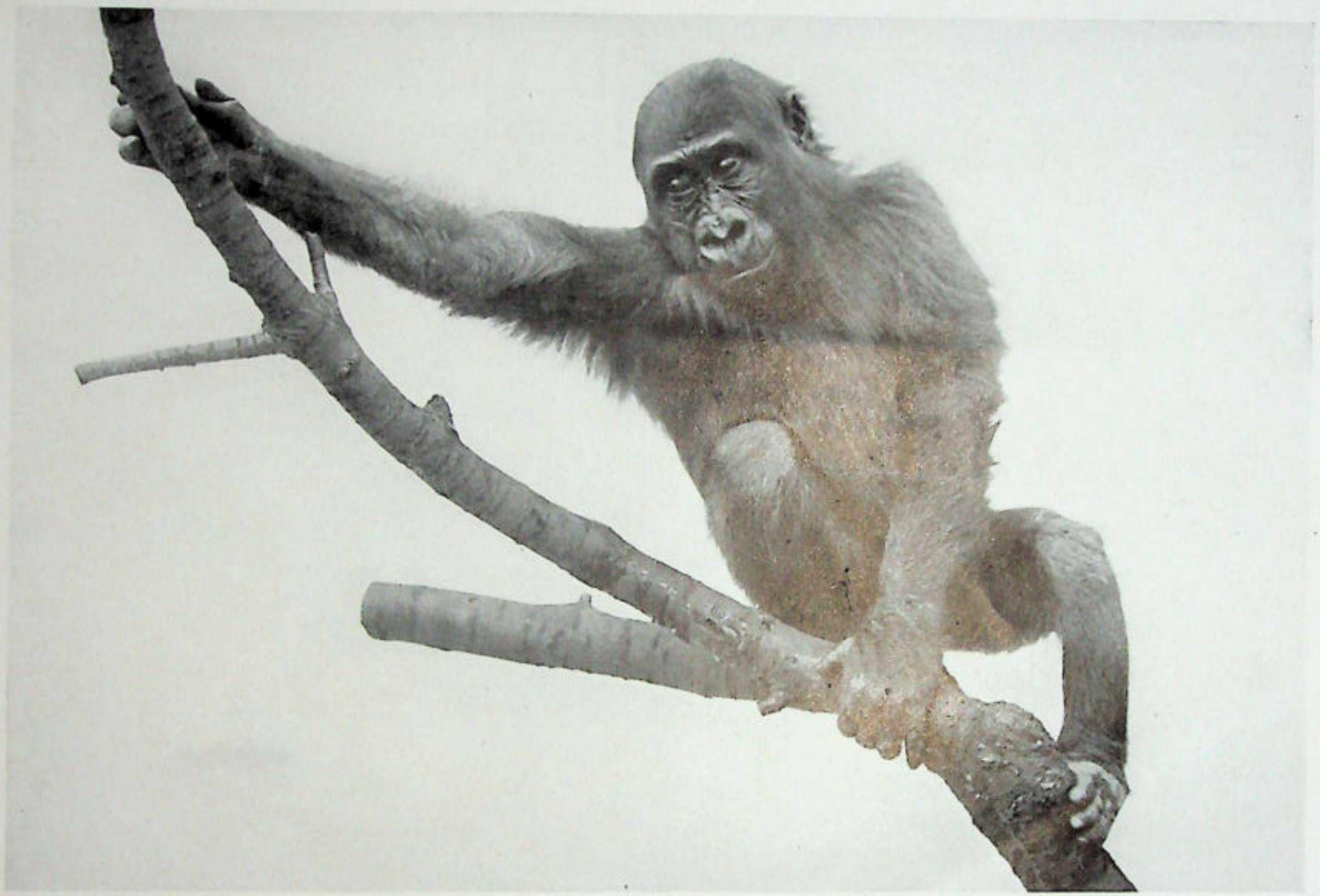


HEAD OF THE AFRICAN RHINOCEROS, VICTORIA

ZOOLOGICAL SOCIETY BULLETIN

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YOUNG FEMALE GORILLA, "DINAH"
Brought to the Zoological Park, August 21, 1914, by Mr. R. L. Garner.

ZOOLOGICAL SOCIETY BULLETIN

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GORILLAS, PAST AND PRESENT

By WILLIAM T. HORNADAY.

UNDOUBTEDLY, the highest desire of every zoological garden and park, and of every showman, is to own and exhibit a real, live gorilla of a size sufficiently large to compel both admiration and awe. The human mind loves to contemplate, with a suitable intervention of bars, the apes that stand nearest to man, and at the same time human nerve-centers love to be racked and thrilled by a beast that is both ugly and fearsome.

Even after all has been said about the gorilla that the devotees of Truth can say, The half hath not been told. The life history of that species is a black mystery. Even the geographical range of the genus *Gorilla* is definable only in general terms. If we are moved to accept some rather cloudy, ancient history, we may believe that Hanno, the Carthaginian, on his famous but mysterious voyage to Fernando Po, something like 550 B. C., discovered the gorilla, and first made note of its existence. But it may have been a chimpanzee; and probably it was; and a captive chimpanzee, at that. We think there is small chance that Hanno ever saw a gorilla, alive or dead.

A gorilla skull was discovered in 1846 by the Rev. Dr. J. L. Wilson. The gorilla as a living animal was discovered by Paul B. Du Chaillu, in 1856, and by him properly and painstakingly exploited in his book, "Adventures in Equatorial Africa," in 1861. The real discovery of this remarkable species occurred on August 24, 1856, near an abandoned native village, on the top of a small mountain range at an elevation estimated at 5,000 feet, drained by the Ntambounay River, which flows into the Muni River, sixty miles north of the Equator, opposite Corisco Island. The precise spot is seventy miles north of the Equator, and 115 miles from the coast; and it was not on the Gaboon River at all.

Skulls and science are all very well; but for our knowledge of the gorilla we owe most to Paul Du Chaillu and his popular book, "Equatorial Africa." It was through that hair-raising and altogether masterful presentation that the greatest and most fearsome of the great apes burst upon an astonished world. It is a matter of history that when the doughty explorer landed in America with a priceless collection of gorilla skins and skeletons, expecting and deserving an ovation, he was bitterly disappointed. At that time American zoology was still in its swaddling clothes. There were few museums of any kind, and few persons who cared about ape skins or ape stories from far distant Africa. As a result, Du Chaillu resentfully gathered up his collection and took it over to England, where it was better appreciated.

Going or coming, the gorilla is a most elusive animal. All the observations of living specimens that ever have been made, added together (but not duplicated), would not make one small book. Only one gorilla ever has lived in captivity long enough to establish a record and constitute a case worth while. That unique instance of longevity occurred in Breslau; but if we were as careful to avoid all references to German zoological gardens as all German writers are to avoid all references to the New York Zoological Park, we never would mention it! Strange to say, the Breslau gorilla is so little known in literature and among mammalogists that even the latest and largest work on the primates does not even mention it by title; but it lived in captivity seven years!



FOOT OF THE GORILLA
Upper and lower surfaces.

The objectionable features of the gorilla are its much too savage habits, and its aversion to food and life in captivity. It is not an animal of philosophic mind, nor is it given to intelligent reasoning from cause to effect. It reminds one of children who refuse to taste a new kind of food because they know in advance that they won't like it! And what can we do with a wild animal that is not amenable to the pangs of hunger, and would rather die than yield? The first gorilla that came to us, in 1912, was on arrival in a low state physically, from food-refusal, and its food preferences and aversions were at once the rage and the despair of its keepers.

Of the score of good things offered that gorilla, and of which it should have eaten, it partook of not one. It refused the finest bananas, but it did attempt to eat microscopic portions of the inner lining of banana skins. It desired either plantains, or the succulent centers of banana plants; these, and nothing more. The New York Botanical Gardens loyally sacrificed to science, as represented by the emaciated body of a food-sick gorilla, two perfectly good banana plants, and their hearts were duly consumed. By the time we had secured a small lot of spoiled plantains from New Orleans, and two dozen good ones from Cuba, the gorilla was dead; which, as a purely logical proposition, it deserved to be, for its obstinacy.

It took us nine months to recover from the shock of our first gorilla. Then we formulated a plan of campaign by which we hoped to secure at least one gorilla that should reach us not only alive but in good health. We believed that if we could secure a specimen in that state we could make it live for at least two or three years. Having failed three times to secure gorillas by ordinary purchase from Hamburg and London, because in each case the animal died before shipment, or before reaching our shore, we abandoned all hope of winning in that way.

We decided that we could win a good gorilla by sending Mr. Garner to the gorilla country, with a two years' contract to collect gorillas, keep them there in their home country in comfortable captivity, teach them to eat civilized food and become personally attached to him. Then, whenever one or more specimens had become well grounded in captivity, he should bring them to New York, on the most sanitary and sumptuous basis that steamer accommodations could offer.

This plan was carried out, in every detail. Mr. Garner secured two gorillas, Dinah and an understudy named Don. The latter died at the



HAND OF THE GORILLA



CONFLICT BETWEEN GORILLA AND NATIVE HUNTERS

Group modelled by William Umlauff (Hamburg) to illustrate an actual occurrence in German East Africa, in which two hunters were killed by a Gorilla.

end of a three months' sojourn at Fernan Vaz, of general lack of stamina. Dinah, a lovely female gorilla three years of age, landed in New York on August 21, 1914, the last wild animal to come out of Africa prior to the complete embargo of war! Thanks to the kind co-operation of the Zoological Society and Gardens of Rotterdam, where Mr. Garner and Dinah incontinently landed to escape the war, the gorilla was handsomely cared for during the anxious weeks that elapsed before it became possible to secure steamer accommodations to New York. Those were the days that tried the souls of tourists and gorillas alike.

It is the firm belief of Mr. Garner that, taken all in all, Dinah was at that time "the best gorilla that ever came out of Africa." For a wonder of wonders, she was (and still is) cheerful, good-natured and affectionate, instead of being, like other captive gorillas, morose, savage and resentful. She ate with relish several kinds of civilized food, and drank quantities of water. In order to improve the shining hour, she was immediately placed on exhibition, and even the great throngs of people who flocked to the Primate House to see her did not seem to annoy her in the least.

Without any violent jar, her affections were skillfully expanded until they embraced her new keeper, Fred Engeholm, who was detached from the service of all the common baboons and monkeys of the collection and concentrated on the anthropoid apes. Dinah made friends with many persons, including secretaries, directors, curators, keepers, reporters and photographers. She posed for scores of pictures, moving and fixed, and in every way strove to fill the high position in the zoological world to which nature and the Zoological Society had elected her.

When Dinah arrived, the first thing seen of her was her nose. Its half human elevation is a general focus of attention. Her whole face is jet black, and as shiny and smooth as polished ebony. Next to her nose, her most captivating feature is her large, liquid-brown eyes that make a distinct appeal to human sympathy. They are indeed human-like, and in development far above the elfish, cunning orbs of the chimpanzee, or the small, pig-like eyes of the orang. I cannot recall that thus far any observer has pointedly called attention to the humanlikeness of the gorilla's eyes, but really, it is the second feature that should be noted in that remarkable animal. Both in shape and in



DINAH SELDOM WALKS ERECT
Sometimes in this position the fingers of her hands are doubled under.

size, the ear is nearest to the ear of man, being much smaller than the huge, wing-like ear of the chimpanzee and much larger than the absurdly small ear of the orang.

The short arms, long legs and mannish hands and feet are all of them much nearer to the form of those members in man than can be found in any other member of the Order Primates. The fingers and toes are short, and in walking they usually lie flat upon the ground, instead of being doubled under as they are in the orang and chimpanzee. The entire skin of this gorilla is black. The hair is abundant, but not long as in the orang, and on this three year old specimen it has the peculiar gray tone of a dark-colored "silvertip" grizzly bear. This gray tone becomes much stronger with advancing age; and an old male gorilla usually is as gray as a badger.

In walking, our gorilla does not stand erect one-half the time. Her favorite posture is on all-fours, and when she does stand erect, her legs are not as straight as one expects to see them. The knees are always slightly bent, which has the effect of giving the figure a slightly stooping posture.

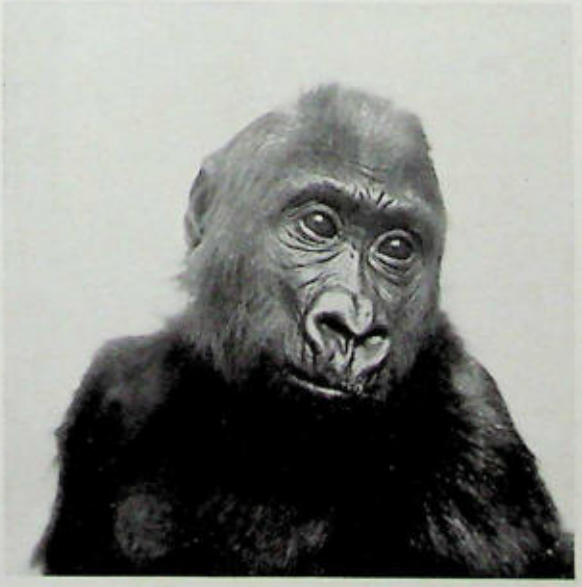
On September 1, 1914, Dinah weighed forty and one-half pounds. Her standing height was three and one-half feet, and the extreme spread of her arms and hands between the tips of her middle fingers was four feet two and one-half inches.

In view of the food-habits of our first gorilla, Dinah's menu is interesting. When her appetite was at its best, (in September and October,) her daily food program was about as follows:

At 8 a. m. she took a raw egg beaten up in milk. At 10:30 she was given a fruit course, consisting of the best fruits in season, whatever they chanced to be,—apples, bananas, oranges, pears or grapes,—two or three different kinds. At 11:30 she received a small ration of bread, or crackers and water. At 1:30 came her most substantial meal, a regular dinner in fact, brought hot from the Rockingstone Restaurant in a dinner-carrier conveyed in a tight box. This meal always contained a good cooked-meat dish, either roast beef, broiled chicken, or lamb, with gravy, mashed potatoes and bread. She would not eat ordinary vegetables! She scorned boiled potatoes, spinach, beans and sprouts.

At 3 p. m. there was another diversion with fruit and bread. Between 5 and 6 o'clock she received milk and a raw egg, as in the morning; and at 8:30 her day closed with a drink of plain milk.

Drinking water was either given frequently, or kept accessible at all times. While in Mr. Gar-



THE MOST PROMINENT FEATURE IS HER NOSE
Her liquid-brown eyes are very human-like.

ner's possession in Africa and aboard ship, she drank great quantities of water, sometimes as much as three *quarts* in one day.

Dinah's health remained excellent—until November 15. Then it was noticed that in a very strange manner she kept all her fingers constantly closed. She walked upon them closed; she climbed with them closed. At once we began a treatment of massage and liniment; which seemed beneficial.

By November 25, it had to be acknowledged that Dinah's appetite was failing somewhat, and that the muscles of her legs and arms were not up to the mark of robust health. The failure of certain leg and arm muscles to perform their functions looked like locomotor ataxia, or infantile paralysis. A careful examination of the case by Dr. Amoss, of the Rockefeller Institute of Medical Research, revealed the fact that the spinal chord was free from the bacteria that cause infantile paralysis; and therefore we are led to hope that if Dinah's appetite will only support her adequately, she will outgrow her locomotor ataxia.

There is not the slightest reason to hope that an adult gorilla, either male or female, ever will be seen living in a zoological park or garden. Large specimens cannot be caught alive in condition to long survive. The savage and implacable nature of the animal is against it. Only young specimens, usually under two years of age, can be captured and civilized; and even when a specimen has been so taken and settled down, it is due to die overnight, and from no understandable cause.

The average lifetime of a gorilla in Europe is about nine months, or less. In captivity gorillas are utterly lacking in stamina, and instead of rivalling the orangs and chimpanzees, they are as difficult and sensitive as howling monkeys. There is no excuse whatever for Dinah's locomotor ataxia; and therefore we hope that with the aid of the electrical treatment and massage that she is receiving she will eventually recover.

I think that the popular idea of the great strength and ferocity of the adult male gorilla on his own ground is not in the least exaggerated. Although the height of a big male is only five feet six inches, its breadth of chest and general muscular development are such that even were its powerful teeth eliminated, it would be impossible for enough strong men to get around an "old man" gorilla to hold him and put handcuffs on him. No one ever has weighed an adult male gorilla, but it would seem that an estimate of 400 pounds would not be far from the truth.

One of the difficulties involved in the capture of young gorillas lies in the fact that the French Congo Territory contains the best gorilla country, and the French government resolutely prohibits the importation of gunpowder for use by the natives. It was impossible for the Zoological Society to procure permission for the importation of five pounds for Mr. Garner to give to the hunters whom he desired to send out to capture gorillas for us. Without firearms, it is only the boldest and most reckless native who dares to go hunting for gorillas.

It is unfortunate that the ape that, in some respects, stands nearest to man, never can be seen in adult state in zoological gardens; but we may as well accept that fact,—because we can not do otherwise.

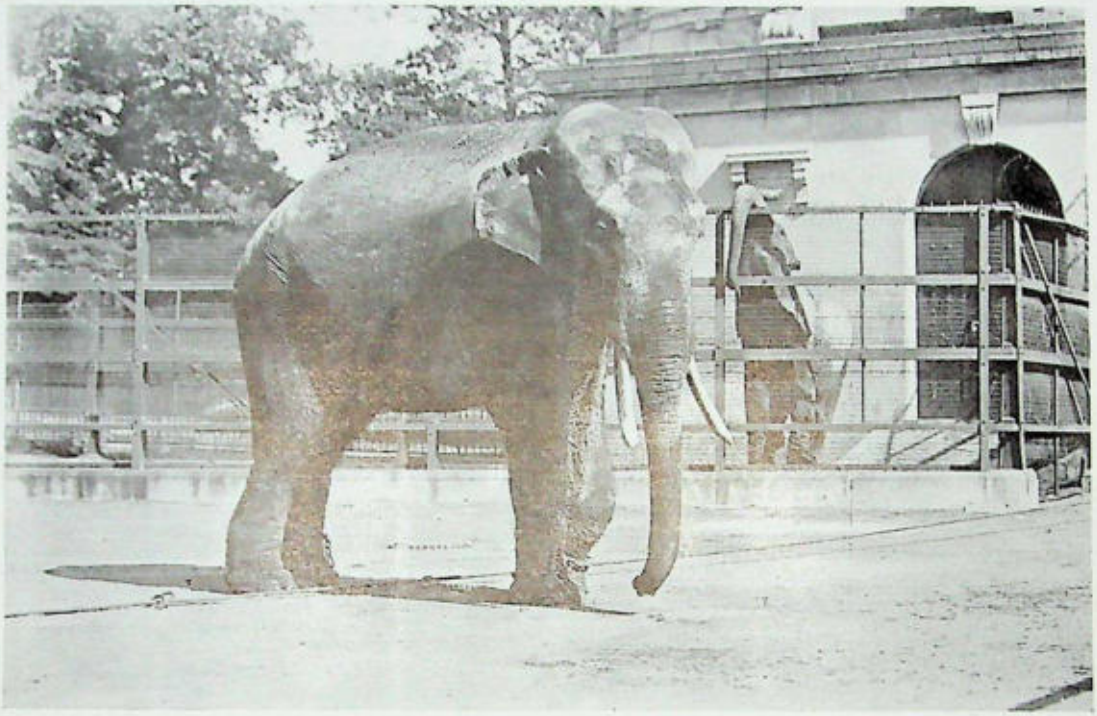
INDIVIDUAL TRAITS OF ELEPHANTS.

By Raymond L. Ditmars.

THERE are no group of wild animals where individual traits are more strikingly apparent than among the elephants. Five elephants representing three species are on exhibition in the Zoological Park and each of these animals exhibits markedly different mental characteristics. Idiosyncrasies, we might say, are common among pachyderms; and the large female Indian elephant Alice, is a good illustration.

In her stall Alice is a gentle and obedient animal, with no bad traits. Under such conditions she is calm, and not disposed to be mischievous. The same demeanor prevails as she wanders during the warm months, about her spacious yard. Taken away from her usual quarters and subjected to scenes in any way foreign to her usual routine, she becomes dangerously erratic and seems possessed with a blind passion to destroy. During such exhibitions of her erratic temper, there is no inclination on the part of Alice to attack any human neighbor. Her energies are directed against inanimate objects; and at times she is utterly beyond control, and deaf to all commands. We have experienced two such illustrations from Alice—when we moved her from one building to another—and the line of her progress was marked by a trail of overturned refuse cans, damaged saplings, overturned benches and bent fence-posts. And yet to observe Alice in the elephant house, she seems a uniformly calm and docile elephant, which she is—so long as she is at home.

Alice is very fond of Congo, the round eared pygmy elephant. Though Congo is a well-ma-



INDIAN ELEPHANT, GUNDA, TRYING OUT A NEW INVENTION
He can walk across his corral attached by a chain to the cable that extends from his stall to a staple in the ground near the center of the yard.

tured animal, his small size causes Alice to treat him as a tender infant. Owing to a bad case of rheumatism Congo recently was removed to a temporary hospital building. For several years he had occupied the stall with Alice. When he was taken out, Alice strenuously objected, and for a few hours was inclined to resent any intrusion from the keepers. During part of that day our men were warned by the gleam of her eyes to keep away from her. She restlessly paced the stall, trumpeted frequently and was distinctly grieved for some days.

Congo's individualism is manifest in utter stubbornness. When taken for a walk he has a decided inclination to stop and make leisurely inspections on the way. Nothing can budge him until he decides to go, and if he imagines there is a possibility of force being used by the keepers, he seeks a soft spot, practically stands upon his head and drives his long tusks into the ground, as an anchor, against further disturbances. He never has been savage or destructive.

Sultana, the female of the pair of Sudan elephants, is the most docile member of the collection. Her idiosyncrasy is indicated in an unfailing interest in labels. No label, unless of boiler iron, can withstand her curious and rough investigation. An elaborate board label, hanging temporarily near Sultana's stall, finally was secured by this elephant after she had stood upon her hind feet, and made heroic efforts to reach the prize. This board had involved much work on the part of our label painter, and we were surprised and grieved to find that Sultana had for a time paraded about with it in her mouth, and ended her diversion by endeavoring to stand with all four feet upon it. The label was then beyond recognition to all but its makers. All present labels within reach of Sultana are of heavy plate iron, rigidly bolted to the cage-work. Sultana is constantly engaged in investigating the security of these fastenings, and constantly hopes to undermine them.

The male Sudan elephant which arrived with Sultana seven years ago is the most mischievous pachyderm in the building. Kartoum was captured on the Blue Nile in 1906, and we have estimated that he is about eleven years old. When he arrived at the Park in June 1907, he was a mere infant, four feet nine inches in height, and weighed 1235 pounds. He is now

seven feet three inches in height, and weighs over 4500 pounds.

While Kartoum is ever restless and very destructive, he is not savage, although at maturity African elephants usually become erratic and dangerous. His huge, flappy ears, narrow head, corrugated trunk and swinging gait make of him the most spectacular of our elephants, although this point might be disputed by the mighty Gunda, with his nine-thousand pounds of bulk towering aloft in the adjoining stall.

Kartoum's favorite sport is to employ his head as a battering ram in an endeavor to loosen masonry, doors and cagework. In these attempts he is untiring and the Elephant House frequently thunders and vibrates under his destructive industry. It has been found necessary to protect the doors and other vulnerable places with bristling armaments of sharp spikes. Trees, fence posts and corners of the buildings have been tirelessly butted by Kartoum, and the animal's tusks, once promising and well-grown, have been worn down deep into his leathery lips.

Kartoum's minor sports consist of wild rushes and whirls, like frantic dances. Nothing movable is for a moment permitted in his stall, because he can and will raise objects of considerable weight and toss them at his visitors. His antics are clownish, but his colossal strength makes it necessary to confine his manoeuvres within solidly-bounded limits.

Gunda, the great male Indian elephant, always is of great interest to visitors, owing to his impressive bulk and his reputation for vigorous temper. Gunda is a creature of the seasons. To say that he suffers from captivity is to quite misunderstand the situation. There are good and bad elephants. Some become so utterly bad as to require chains for life. We do not believe Gunda ever will need to be classified among the rogue pachyderms. He is of high caste, a patrician among elephants, and is wilful and desperate only at specific times. There is a period each year when most adult male elephants are more or less disturbed. This occurs in the spring, and the breeding period is designated as "musth." The maturing Gunda indicated this condition in the spring of 1913. He had been daily becoming more surly and one morning when Keeper Thuman was leading him out of the stall where the animal had been at liberty, Gunda charged, hurled Thuman to the floor and badly gored him with one of his tusks. Thuman was dragged out by Keeper Richards, who bravely entered and drove Gunda out into the yard.

When Thuman returned to the Park, after three months painful absence, it was with unconquerable feelings of friendliness for the big elephant. He had begged that Gunda be given "one more chance." Gunda was chained in his stall for the greater part of the time, but finally given liberty in his yard as he again became tractable the following fall. During the spring of 1914, Gunda again broke out. He became so dangerous that Director Hornaday ordered him chained fore and aft. Without so doing it was impossible to enter and clean his stall. The chains were attached or shifted with great difficulty, because Gunda was bent on mischief. A number of visitors who were not versed in the ways of elephants were much moved to pity at the sight of the chains, and assumed that the animal was suffering tortures. There have been instances of bad elephants in this country that were permanently chained under far more strenuous and uncomfortable conditions than Gunda, without any public outbreaks regarding them. At the same time our feeling for the great beast was that of sympathetic interest, not revenge.

Despite Gunda's lunges, charges and blows, Keeper Thuman remained uniformly friendly. Nothing was more remote from Thuman's mind than punishing the elephant. As Gunda recovered from his period of "musth," Dr. Hornaday had a heavy wire cable stretched from the front of his cage across the outside yard, close to the ground, and to this Gunda was attached by a single chain with a sliding ring. He was practically at liberty, and restrained only from a direct charge to any considerable distance. This arrangement, which was made as soon as it became safe to make the change, was accepted as satisfactory.

The sympathetic reader will imagine that Gunda exhibited exuberant joy at his release from the chains in his stall. Was that the case? Not at all! The massive stall doors were thrown back and Gunda walked out into the yard and sunlight. He walked about for an hour, then returned to his usual place, in the stall where he swung back and forth and surveyed the crowd! That was his daily performance. Contrary to all romantic theories, Gunda's principal diversion is to stand in his stall, solemnly munching hay and rocking to and fro like a boat in a cross swell.

While on that cable, and practically free, he spends much more than one-half of the daylight hours standing quietly in his indoors compartment.

ZOOLOGICAL SOCIETY BULLETIN

Departments:

Mammals
W. T. Hornaday.

Birds
C. William Beebe.
Lee S. Crandall.

Aquarium
C. H. Townsend.
Raymond C. Osburn.

Reptiles
Raymond L. Ditmars.

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Elwin R. Sanborn,
Editor and Official Photographer

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WRECK OF THE BOSTON ZOOLOGICAL PARK.

In 1910, after thoughtful and effective study, the Board of Park Commissioners of Boston, headed by Robert S. Peabody, a distinguished architect, completed and published an excellent plan for a zoological garden in Franklin Park. The new institution was designed on broad and dignified lines, it was reasonable in scope and it laid the foundation of a zoological park in every way worthy of the fifth city of the United States. The site chosen was admirable, and of little use for other purposes.

The funds necessary for construction were obtainable without recourse to taxation, or even to bond issues for the borrowing of money. The income of the great fund bequeathed to the city by Francis Parkman, for the development and improvement of the city parks of Boston, made available $200,000 per year for expenditure in building an aquarium and zoological park; and the Park Board and Mayor Fitzgerald agreed that for its outfit of buildings and other improvements, "the zoo" should have $200,000 per year for five years.

The approved plans were handsomely published in October, 1910, and immediately the Park Board began to carry them into effect. A fine aquarium was built at Marine Park, and bear dens, a great flying cage and bird house were built in their allotted places on the zoological park site. An expert was brought from the Bermuda Aquarium as director of the Aquarium, and Mr. Arthur B. Baker, assistant superintendent of the Washington Zoological Park, was secured as director of the zoo, and duly installed.

In their mild and dignified way, the people of Boston were well pleased. There was not a breath of criticism or opposition. The new benefits to accrue to the wage-earners of Boston seemed fairly within their grasp.

In 1913 Mr. Curley was elected mayor. He took office on January 1, and by July 1 the plan for the Boston Zoological Park was a complete wreck. The director of the Aquarium was out, and a political swimming-teacher was rolling around in the directorship, like a pebble in a gourd. Mr. Baker resigned in disgust and went back to Washington. Just who is now director of the zoo, we do not know, nor care. A gardener named Dillon was appointed by Mayor Curley to the presidency of the Board of Parks, and for a dozen reasons Mr. Peabody and Mr. Coakley resigned.

In the sacred name of economy—economy of money not furnished by the taxpayers of Boston,—the Peabody plan for a zoological park worthy of Boston was thrown upon the scrap heap of politics, and there it lies today.

But all was not lost. The administration accepted as a gift three Indian elephants, and now is (supposed to be) erecting an elephant shed—it cannot properly be called an elephant house—at a cost of $25,000 for those three elephants alone. If a real elephant house ever is built in the Boston zoo, that shed will not even be as useful as a lean-to; but this is economy.

At present, we repeat, that the plan for a great and worthy Boston zoo is a wreck. Thus far two men of Boston, Dr. J. C. Phillips and C. Emerson Brown, are the only men interested who have had the courage to publish their protests against the Mayor's course. The Mayor accuses his critics of selfishness and a desire to loot.

The effort to create a Zoological Society of size and power to safeguard the Boston zoo ended in failure, several years ago, and there being no one in the field to safeguard the interests of the public, Mayor Curley has smashed things with joyous freedom and entire immunity from active opposition.

Fortunately for the American people, the elevation of an ordinary man, or even an inferior man, into the highest municipal office, usually has a sobering effect. Usually it brings out the best that is in the man, and inspires him to do his level best to rise to the occasion. City institutions rarely are wrecked, or even crippled by such men, especially after institutions have become going concerns.

But from such mayors as Mr. Curley, safeguarding bodies of strong men are necessary. Since 1896, New York City never has had a

mayor who would have wrecked the Zoological Park even if he could; and even Boston may not have another in a hundred years; but for the present, Mr. Curley is there.

As a partial voucher for the situation, Mr. Alexander Pope was led into giving the individual animals in Franklin Park a clean bill of health as to care and treatment; but it is not with the individual bears and monkeys of 1914 that we are concerned. We are angry and disgusted because ignorance and folly have wrecked a fine plan for a great zoological park. As a result, it now may safely be predicted that Boston never will have a zoological park or zoological garden worthy of serious consideration, or worthy of that city. W. T. H.

FIRST NEWS FROM THE ANTWERP ZOOLOGICAL GARDEN.

From the date of the bombardment of Antwerp, great apprehension has been felt regarding the fate of the beautiful and costly Zoological Garden of that city. Messrs. Lorenz and Heinrich Hagenbeck, both of whom are yet in Hamburg, alive and well, have furnished us with a copy of a letter received by them from Dr. Buttikofer, director of the Rotterdam Zoological Garden, which reads as follows:

All the bears in the Antwerp Zoological Garden were shot prior to the bombardment. The large feline carnivora were put into strong transportation cages and removed to the rear of the garden, likewise prior to the bombardment, while the small felinae were transferred to cages in the cellars of the Festival Building. A few days before the surrender of the city, when the heavy cannonading started fires in all parts of the city, which could no longer be put out in consequence of lack of water, the large carnivora were likewise shot by resolution of the Board of Directors, *adopted contrary to the director's advice*. None of the other animals were killed, with the exception of a few venomous snakes. During the bombardment only one shell dropped into the garden, striking the ground in the open space for the turtles, where it fortunately did no material damage. Mr. L'hoest and his two younger children were my guests from October 5th to the earlier part of November, while the other members of his family likewise came to Rotterdam towards the end of the bombardment. Mr. L'hoest himself, whose mind had suffered severely from the effects of the terrible excitement and of the successive events which overpowered him, also came to Rotterdam for a few days, after the bombardment.

By the earlier part of November all the members of the family had returned to Antwerp.

The garden and the animals kept there have suffered no further damage during the siege, but you will readily understand that the number of visitors has so decreased as to be practically nil, while the membership will undoubtedly be reduced to such an extent that the very existence of the garden will apparently be put into serious jeopardy.

Everything here is in good shape, although there has likewise been a large decrease in our receipts, which compels us to be exceedingly economical. I presume that similar conditions prevail in all the Zoological Gardens in Germany, as well as in your country.

With kindest regards I remain

Yours very truly,

I. Buttikofer.

A SAMPLE OF OPPOSITION.

The following letter, reproduced as written, may be taken as a fair sample of the opposition to the federal migratory bird law that occasionally is discovered:

W. T. H.

JACKSON UNDERTAKING CO.
Fine Funeral Goods.

Chicago, Ill., May 22, 1914.

Dr. W. T. Hornaday,

Dear Sir

Just a gentle reminder, if old —— —— —— and yourself was posessed of some real christian charity instead of your misplaced efforts on migratory birds, both of you could really help humanity by devoting that money to the improvement of orphan and needy children. us western hunters will kill all the birds' we want to kill.

Yours sincerely,

Frank O. Baker.

NEW MEMBERS.

July 1, 1914-December 31, 1914.

Life Member.

Joseph A. McAleenan.

Corresponding Member.

G. Tyrwhitt-Drake.

Annual Members.

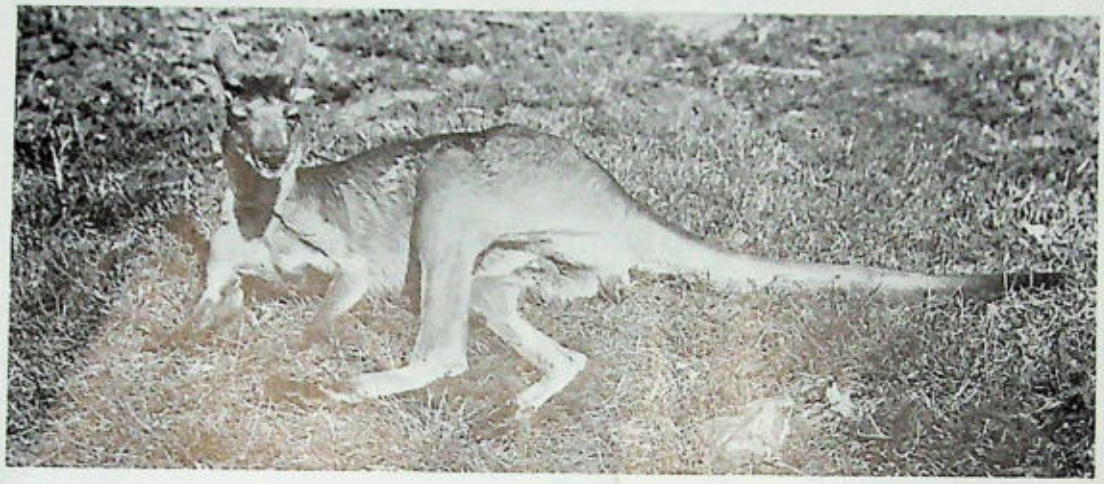
Ernest Abs-Hagen
George J. Bryan,
C. L. Carpenter,
Edward H. Clark,
Case Edwards,
Louis J. Ehret,
George Lauder, Jr.
Arthur C. Mack,
Dr. Philip Manecke,
Miss Lucy B. Marks,
Robert W. Martin,
Fritz vonBernuth, Jr.,
A. R. Walty,
W. P. Willis,
Joseph Wittman.

Growth of the Stellar Sea Lion.—When first installed with the other pinnipeds the Stellar sea lion was not particularly noticeable, as he was of smaller size and similar color. This animal has steadily grown until now it appears to weigh over two hundred pounds. His massive build, large eyes and hoarse, guttural cry at once attract attention. Adult males of this species attain a length of ten feet, and a weight of about fourteen hundred pounds.



ANOTHER VIEW OF THE MARSH GARDEN

Great masses of iris form one of the many charms of this beautiful spot.



GIANT RED KANGAROO
Resting is an art with this awkward animal. He stretches out with perfect abandon.

ITEMS OF INTEREST.

Recent Arrivals.—Among the recent arrivals at the Park is a series of exceptionally interesting amphibians from Australia. Several of the species have never before been exhibited alive in the United States. Among these are the beautiful golden tree frog, marbled with gleaming bronze and metallic green, White's tree frog, which is a gigantic member of its race and the silver frog. The call of the White's tree frog resounds throughout the Reptile House, and is a novel diversion in a building where silence usually reigns among the thousand or more inmates. Another Reptile House addition is a big anaconda, from Venezuela.

Few mammals have been recently added to the collection, as war conditions in Europe have practically closed the foreign animal market. A splendid example of the Abyssinian lion was recently purchased. The name of this beautiful creature is Menelik, and he is particularly noticeable owing to his pale coat and almost golden mane. He is long of body, with the straight back so admired by animal sculptors.

Important among recent mammals received are two Rocky Mountain goats from the Canadian Rockies.

The Venerable Sultan.—For many years a reigning favorite among animal sculptors, and posing for fully a hundred works of art, Sultan, our oldest lion, now shows marked signs of old age, and has been assigned a spacious cage where he receives special care. Sultan is a Barbary lion, with a particularly fine mane of rather a dark hue, and which pleases the sculptors and painters because it is not too abundant, and does not mask the muscles of the shoulder. He arrived at the Zoological Park twelve years ago, and was then five years old. He is the gift of Mr. Nelson Robinson.

The average "old age" of captive lions is thirteen years, but this seventeen year-old patriarch still remains fairly active. Director Hornaday has prepared a special label that has been posted upon Sultan's cage and which explains to visitors that the lion's apparent infirmities are the result of old age only, and stating as well the favorite's useful career in the world of art.

Sultan recently was given a large felt mat upon which to sleep, but our kindly intention was misconstrued. The mat was fastened to the floor, then the lion was run into the cage from the outdoor enclosure. When Sultan observed the mat he charged upon it with great energy, tore it from its fastenings, then proudly carried it about in his jaws as he furiously growled. The performance lasted for an hour or more, with a final result that the mat was badly torn and the lion much exhausted. We have since been unable to induce Sultan to believe that the mat is not some strange type of living intruder, to be subdued only by the vigorous use of teeth and claws.

The Yak Family.—One of the interesting sights of the Park is to be observed at the new Yak House. Our pair of black yaks is proudly exploiting a calf three months old, which is a really attractive infant. The youngster is blue-black, and its coat is exceptionally thick and woolly. The mother never permits it to wan-



YAK CALF

der more than a few feet away, and it causes her much anxiety, owing to its continuous inclination to gambol and play over the rolling surface of the big range. This playful nature was probably inherited from the father, who for some time has leaped and capered in circles about Keeper McEnroe, until we have become suspicious about his antics in maturity, as we have some doubt regarding his present intentions. Although inclined to cavort about his keeper, and to make amazing jumps and leaps, he has developed a trait of backing away, pawing up the ground and plowing furrows with his long horns, all of which are actions now to be viewed with suspicion, on a basis of safety first.

The Gorilla.—A large outside cage room has been constructed for Dinah, the only gorilla now living in captivity. This was done by entirely lining the large outside cage at the north-eastern corner of the Primate House, with glass panels. Dinah may go out when she likes. The new room is not heated, and if she becomes chilled she may return to the inside cage, as do the smaller monkeys at the south end of the building, which run out-of-doors into an unprotected enclosure and play for hours—even in the snow—on severe winter days. In her play-room Dinah has a spring-board, ropes, swings and various indestructible playthings of which she is fond. The intention in thus arranging her quarters was to permit her to become accustomed to air at a lower temperature than that of the Primate House, and produce, if possible, a certain immunity against pulmonary troubles so common among captive anthropoids. Unfortunately, just at present Dinah is weak from malnutrition, and her out-door quarters will be of no use to her until she recovers.

The Laughing Hyena.—Much consternation is to be noted on the faces of visitors near the Bear Dens when the big spotted hyena indulges in his vocal eccentricities. At feeding periods, the peculiar laughing sound, which is quite ghastly when in close proximity to the animal, is likely to cause visitors to appear really startled. The most frequent and characteristic accomplishment of this hyena, however, is a siren-like wail that may be heard a considerable distance. It is the most penetrating sound produced by any member of the Park collections. When the hyena gives voice it reminds the nearby visitor of the effect produced by a big steam whistle on the deck of a boat when one is but a few feet away. The hyena and the South African hunting dog are occupying northerly compartments of the small bear dens, which are enclosed in glass. We think the animals will do better under these conditions during the winter than within a heated building.



GIANT RED KANGAROO

Supporting himself on his tail while the tips of his toes preserve the balance. An attitude for offense or defense.



AN ACROBATIC GOAT—HIMALAYAN TAHR

This hardy and skilful mountaineer, in lieu of rocks to climb, ascends the great oak in his corral.

Success with the Gibbons.—From time to time we have pointed out with some pride the continued good health of the white-handed gibbon. Animals of this type are extremely delicate as captives. This gibbon remains in splendid health and attracts much attention owing to its wonderfully agile acrobatics and its weird calls. A hoolock gibbon, now in the Primate House about seven months, responds to the cries of the older specimens, and the result is ear-piercing, particularly so when the baboons and lemurs join their varied voices as a chorus.

An Infant Baboon.—For the fourth time since her arrival at the Park ten years ago, the female long-armed baboon is a happy and faithful mother. The infant baboon is carried in her arms, and cuddled in the same fashion as a human baby. The mother never permits it to play farther than a foot away from her. Upon the least suspicious sound the youngster is snatched to her breast, and she retires to the highest and most inaccessible part of her cage. This baby has much worried its parent by a persistent habit of playing with his long tail, in the course of which it has worn the hair away from the tip of that appendage. The mother's method of punishment is to gently bite the little baboon's fingers, varying the pressure of her teeth according to the gravity of the offence.

Signs of Winter.—According to the actions of the outside animals we are destined to experience a severe winter. Severe cold came early this year. A few days before Thanksgiving the mercury dropped to eighteen degrees, and the Park ponds were frozen from shore to shore. The squirrels have built exceptionally large nests, and the prairie "dogs" were never busier than now in gathering bundles of dry leaves for bedding. Moreover, these latter animals are carrying below ground a considerable amount of their food. They are extremely fat, and locomotion is but an awkward waddle. Within two or three weeks they will retire for the winter, and venture abroad only on abnormally mild days. The colony is in good condition. R. L. D.



THE WOMBAT
An interesting marsupial mammal from Australia.

SOME RARE MAMMALS.

By Raymond L. Ditmars.

WE believe that many of our visitors do not fully appreciate the importance of the collection in the Small Mammal House. Many visitors quickly pass through this building in the search to find the installations where the big animals are exhibited. Yet the Small Mammal House has long been a congregating center for students who visit the Park for the specific purpose of making systematic studies of mammals.

This installation is important from the number of orders of mammals represented there. Representatives of from seven to eight orders are at all times exhibited under the one roof, with a large key label showing bands of the different colors that are employed to indicate the respective orders. Each cage label has a band of color that immediately designates the order of the inmates, the accepted scheme of classification.

The Small Mammal House has always been particularly rich in rodents and the smaller carnivora. Among the particularly interesting rodents are the gigantic and gaudy Malabar squirrel—the largest known species of the squirrel genus. The largest rodent in the collection, however, is the capybara, which from gross examination looks more like one of the members of the wild swine group. This somewhat sluggish animal of tropical America is semi-aquatic with markedly webbed feet. Its coat is harsh and bristling, and through the sparse hair may be seen the blackish, greasy skin. A medium-sized capybara will weigh forty-five pounds. This is the largest known species among the gnawing animals.

Another of the big rodents is the tree rat of Cuba, which attains a weight of eight pounds. Rarer among the rodents, though of smaller size, are the beautiful squirrels of the tropics of both the New and Old Worlds. The prevost squirrel is particularly beautiful, with bands of pale cream and rusty red upon a coat of lustrous blue-black. This is a Malayan squirrel, and is rivalled by several species of the American tropics. One of these is a small animal of Central America with a coat that may be likened to shining bronze; and another is dull grey above, but as he dashes about his cage the observer will be startled as the creature flashes an underside of fiery red. These smaller species are closely related to the small red squirrel of the United States.

In the canine series of the smaller carnivores the foxes and their dog-like allies are well rep-



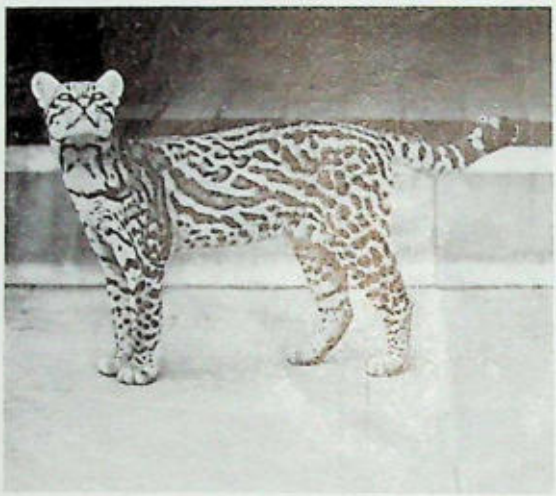
THE BINTURONG OR BLACK "BEAR-CAT"
Interesting because of its strange form and the fact that it is the only prehensile-tailed mammal of the Old World.

resented. These are rather hardy animals, and thus more or less satisfactory for purposes of exhibition. The Mexican stripe-tailed dog has a heavier head than a fox, but the tail is long, and beginning on the posterior portion of the back and extending to the tip of the tail is a growth of jet black hair. Upon the gray coat of this animal, this character is particularly marked. Most curious among these dog-like forms is the raccoon dog, of north-eastern Asia. Coming from a cold country, this little animal is profusely haired, and appears like a walking muff. Few of these wild canines become tame because they are excessively nervous.

Among the carnivores at the Small Mammal House are several species of civets that are veterans among the animals living in the Park. Some of these specimens were among the first live creatures purchased for exhibition here, sixteen years ago. The most unusual carnivore in the building is exhibited in the same series of cages as the civets. This is what appears to be a fisher. It came from Venezuela, and we have been unable to locate him in the scanty literature that delineates the mammalian fauna of that region. He appears destined to become a new species and contrary to the reputation of his allies, the mustelines, he appears to be a hardy creature. As a rule the North American animals of this type survive in captivity but a few weeks.

The most curious animal in the collections described is the hyrax, a diminutive creature, looking somewhat like a guinea "pig" but actually occupying a position in classification that immediately follows the ungulates, or the hoofed animals. From the dentition of the hyrax, which is the Coney of the Scriptures, there is some relationship with the hippopotami.

Students are always interested in the marsupials, or pouched animals, and our small mammal collection contains a number of them. Almost debarred from the series, owing to his size, is the Australian wombat which for the moment might be mistaken for the capybara as size, color and bodily aspect are the same. In habits the wombat is like a rodent, as it lives in deep burrows. It comes forth only at night, and feeds upon roots and tender plants. It hardly seems possible that this ponderous and odd-looking creature belongs to the same order as the dainty and agile murine opossum, the brilliantly spotted dasyure or the strictly carnivorous Tasmanian devil. This latter animal is well worth close observation. The greater portion of it appears to consist of the head, with its powerful jaws. His appetite and temper are quite in keeping with his general appearance.



YOUNG OCELOT
The ocelot is easily tamed and becomes then an interesting pet.

REPAIRS AND BETTERMENTS IN THE PARK.

Renovating the Primate House.—The house for apes and monkeys has had a thorough overhauling. Much of the cage work was re-constructed and improved, and as it stands it is practically vermin proof. All the partitions between the large cages were removed, solidly filled in with bricks and mortar, then covered with vulcanized fibre board. All cage supports were supplied with sanitary bases of concrete. All the wood work was removed from the back passages, and the cages were permanently opened underneath. The railings inside the building were moved farther back from the cages, covered at the bottom with sheet iron three feet wide, and above that wire netting was erected to a height of eleven feet. This effectually prevents feeding the animals, or attempting to kill them with matches, needles and other strange objects such as formerly were thrown in by mean visitors. The protection of the animals is now more complete, and depredations of mice and insects will be greatly reduced.

The ventilating apparatus has been renovated and altered, and the fresh air ducts have been placed under the outside cages on the east side, thus affording very direct draft. Two of the ape cages have been furnished with new fronts of steel bars, and an outside shelter cage has been constructed for the great apes, for winter use.

Reptile House.—The tiles on the roof of the Reptile House together with their supports have been replaced on the entire south side and over the lobby.

Lion House.—In this building ten cages were re-floored with oak and entirely overhauled. Much of the terra-cotta and the adjacent brick work on the eastern wall was reset and re-pointed. An interesting experiment is being conducted to ascertain the virtue of steam pipes under the floors of the sleeping dens to keep them warmer than heretofore.

Bear Dens.—The damaged floors of three dens were rebuilt, and three pools were replaced by entire new concrete construction.

Flying Cage.—Sixteen years' exposure to destructive New York weather has at last so damaged the top third of the great Flying Cage that it requires new wire and some new framework. The scaffolding is already erected, preparatory to replacing the worn out wire work. With the wire weaving machinery in our shops this task can be accomplished at a net saving of about 60%. About 600 square feet of woven wire can be made in a day by one man.

Comfortable for Winter.—In preparation for the winter, the heating apparatus in all of the buildings has been overhauled, storm doors, windows and shields have been placed at the Bird House, Elk House, Small Deer House and Bear dens, and a wind-break at the Yak Shelter. At the same time, leaks in roofs have been repaired. These preparations have rendered the animal buildings better prepared for the winter than ever before. There has been more extensive repairs made this year than in any other year since the opening of the Park, and the buildings in general are in better condition than any time during the past five years. During the prolonged sleet storm of the first week of December, it was a satisfaction to make a complete tour of all the heated buildings for animals, observe the comfort in which the animals were housed, and note their contentment with their surroundings and care.

HERMANN W. MERKEL.

TRANSPLANTING BIRDS OF PARADISE.

A VERY interesting attempt at the transplantation of the greater bird of paradise from the Malay Archipelago to the West Indies is now in progress on Little Tobago, which is a tiny islet forty-five miles northeast of the extreme northeastern point of the Island of Trinidad. In that little sanctuary, happily destitute of rats, and also well nigh snakeless, Sir

William Ingraham, in 1909, set free forty-seven living greater birds of paradise, (*Paradisea apoda*). This is one of the species that is on the high road to extermination on account of its gorgeous golden-yellow plumes.

The transplantation of a wild bird species half way around the world to a new state of self-support is necessarily a long shot, with a limb in the way. In the colonization of any wild species, nothing should be expected in less time than ten years. With birds especially it is the rule that of the colonized individuals, the majority succumb to the enemies that everywhere beset bird life, and to the difficulties involved in learning to live on utterly strange food.

Already there is noticeable a disposition to pronounce Sir William's *apoda* experiment a failure; but surely such a verdict would, to say the least, be quite premature. In August, 1914, Mr. Robert Herold, the caretaker of Little Tobago, reported having seen four male birds, ten females and one young of sex unknown. "There may be two or three more," says he, "but there are certainly no less."

Now even that stock, already settled down and known to be breeding, is sufficient to stock the whole West Indies provided the birds can survive. With such a foundation, *apoda* has on Little Tobago much more than a fighting chance, and we have a right to hope for the complete success of that very plucky and well conducted experiment. W. T. H.

EGRET FARMING IN INDIA

At last there has appeared an item of reliable testimony revealing an instance of successful egret raising for plumes, and the actual taking and marketing of a commercial product in hand-reared "aigrette" feathers. For fear that it may escape the attention of the feather trade, we hasten to point it out.

The Journal of the Bombay Natural History Society, Vol. XXIII, No. 1, for June 30, 1914, contains an illustrated article by Mr. George Birch, Assistant Commissioner of Sind, N.-W. India, setting forth the author's observations of egret raising for plumage as now carried on by the fisherfolk of the inland waters of that province.

In the village of Ber, on the edge of Chango Lake, Larkana District (population about 200), about 1,000 egrets are kept in captivity, and regularly plucked of their plumes for the feather trade. The birds are kept in mat-enclosed runways twenty feet by eight feet by eight feet, very much as pheasants are kept. They are fed on small fresh fish, so liberally supplied that the birds eat to satiety. The birds are really tame, and permit themselves to be seized and handled by their owners, quite as such birds do in zoological gardens.

The breeding season commences in March and continues irregularly up to the end of September. "Eggs are laid never less than twice during the season, and sometimes as many as four or five times;" and it takes twelve months for a bird to reach maturity. The plumes are plucked without injury to the birds, and in view of the fact that the fish supply costs nothing but human labor, the business is sufficiently lucrative to justify its existence.

According to the statement of Mr. Birch, the people of Sind have apparently been about thirty years in developing the industry he describes. At all events, the Commissioner states that prior to that period the natives killed the egrets in order to secure their plumes; and after they began to keep the birds alive they very cruelly blinded them by sewing up their eyes, to keep them from escaping.

Although Commissioner Birch does not state how the birds seen by him are prevented from flying away, it is absolutely certain that they must be pinioned as to the flight feathers of one wing, for otherwise there would be no such thing as keeping them in roofless enclosures, or controlling them.

The feather dealers of London and Paris, and their scientific allies, have demanded that the trade in the plumage of wild birds be continued pending efforts to supply the market with "aigrettes" and paradise plumes derived from domesticated birds. To this, the reply of the Societe d' Acclimatation of Paris, and other defenders of birds has been, that by the time experiments could be made and bird farms established yielding a world supply of plumes, all the wild birds would be dead and past all help; which is literally and everlastingly true.

Naturally, every bird protector would be glad to see created a great bird-raising industry for the supply of the fancy-feather markets of the world; but the idea is utopian, to say the least of it; and the proposal to continue the slaughter of wild birds until it is fully carried into effect is utterly preposterous. The new industry can best be stimulated by an immediate and complete cessation of the traffic in the plumage of wild birds. W. T. H.





THE ROCKY MOUNTAIN BIGHORN *(OVIS CANIDENSIS)* UNDER PROTECTION

These wild animals, which when hunted are exceedingly wary and elusive, have under absolute protection in Colorado become so trustful that they can be approached closely. These fine photographs were taken by Mr. Tod Powell, at Ouray, Colorado, on March 3, 1914.

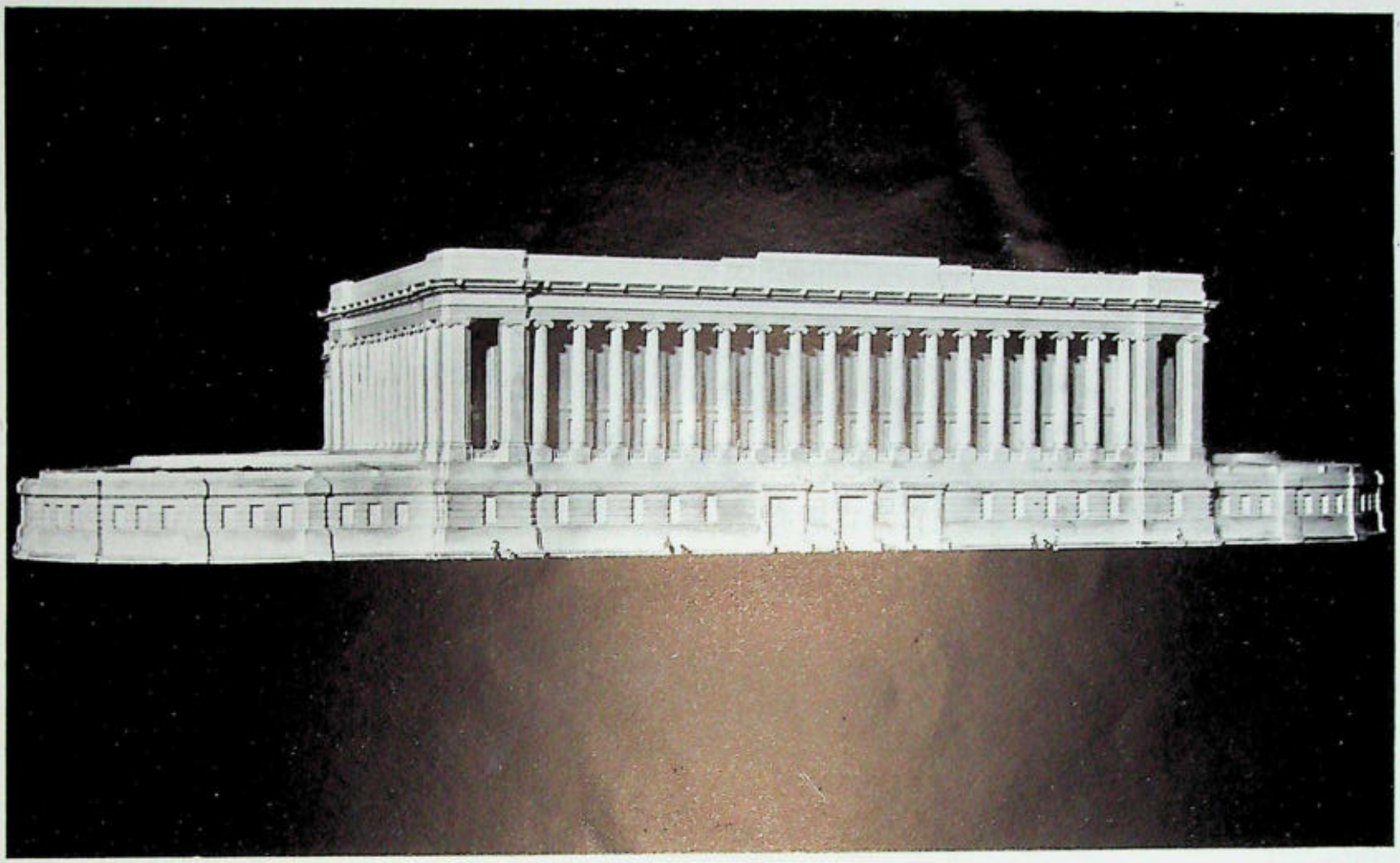
ZOOLOGICAL SOCIETY BULLETIN

AQUARIUM NUMBER

Prepared by C. H. Townsend, Director, and R. C. Osburn, Assistant Director.

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MODEL OF THE PROPOSED ENLARGEMENT OF THE NEW YORK AQUARIUM

The plans for this building, prepared in 1912 under the direction of the New York Zoological Society, were accepted by the City, but funds are not at present available for its construction. The model is now on exhibition at the Aquarium.

ZOOLOGICAL SOCIETY BULLETIN

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THE AQUARIUM OF OUR DREAMS

By C. H. TOWNSEND.

THE beautiful model of the proposed enlargement of the New York Aquarium, has just been moved from the Museum of Natural History where it has long been on exhibition, to the Aquarium in Battery Park. The model is welcome and there will be a certain satisfaction in contemplating this Aquarium of Dreams, but we would rather have a real building even if it were only a little larger and better than the present one.

In 1912 the Executive Committee completed plans for a new Aquarium building, which were accepted by the City as satisfactory, and were then carefully *filed*. They are still filed and may remain so indefinitely.

It may be, as we are assured, quite impossible to provide funds for a new Aquarium, but under present conditions the institution cannot have any growth. It has the misfortune to be housed in an unsuitable building, which it long ago completely filled. The character of its exhibits is prescribed by the character of the water systems with which it is equipped. While its collections are attractive and the number of visitors remains as large as the building can accommodate, the Aquarium is at an enforced standstill. Like the crab and the lobster, the Aquarium cannot grow without shedding its old shell. Other museums have room for new exhibits but the Aquarium has not. When especially attractive specimens arrive, those of less interest must be fed to the sea lion or the porpoise to make room for them.

The Aquarium cannot even change the character of its exhibits without modifying its mechanical equipment, and this would merely allow a change, not an increase. The present building is probably the most unsightly structure in New York. Its entire upper part is of the flimsiest wooden construction, which would burn like a haystack. Constructed a century ago as a fort, it has never had the light or ventilation desirable for a museum attracting five thousand persons a day. It has never had enough space for coal, supplies or repair shop and cannot be administered economically. There is no longer space for an additional exhibition tank, a pump or a filter. Its reservoir is located under Battery Park, as the Aquarium has no basement. Its depressed furnace-room floor and coal bunker are always invaded by the sea whenever the tides reach their highest levels. These are some of the disadvantages under which the Aquarium lives and has its being. During the past few years, considerable money has been spent on alterations and improvements. Little more can be done to the ancient shell to better its light, ventilation or safety for the public.

Other museums in New York are endowed with millions of dollars, but it seems that the Aquarium does not appeal to those who make bequests. Its annual maintenance is less than one-fourth that allowed each of the larger museums of the city. A building like that pictured on the opposite page, would double the space for living exhibits and permit of their best care. It would allow suitable room for administrative, laboratory and library purposes, and permit of comfort for the public.

The purpose to which the present Aquarium building is devoted, must be worth while or there would not be two millions of persons a year passing through its dingy doorway.

THE CARE OF GOLDFISHES.*

By C. H. Townsend.

THE general principles of aquarium management, so far as they relate to the form of the aquarium, its plant life, water supply, temperature, position with reference to light, and the feeding of its inhabitants, apply not only to goldfishes, but to most other species ordinarily kept in small aquaria.

An aquarium holding eight or ten gallons of water will be easier to maintain in good condition than one of small size, and will contain a larger number of fishes with a greater degree of safety. An aquarium of rectangular shape is by far the best for permanent use. It should be of strong, clear glass—preferably plate glass—set in a metal framework, and with a slate bottom. Its corners, however, accumulate dirt which is not easily removed.

Aquaria of rectangular form, made wholly of glass, can be purchased and are cheaper, but the glass is never quite clear, and they crack more readily from changes in temperature. Cylindrical glass aquaria are still cheaper, but they distort the forms of the objects they contain to some extent, and are also liable to crack from water pressure. However, aquaria made wholly of glass have the advantage of being absolutely water-tight, while they remain in sound condition, whereas the joints of metal-framed aquaria often leak.

Globes are worthless. Good results cannot be expected with them. The restricted surface of a globe at the top lessens the amount of water surface exposed to the air. The more surface exposed for the absorption of air, the better.

The aquarium should be placed where the amount of light reaching it can be well controlled. A north window is best, an east window will do, but exposure in other directions will make its care more difficult. If large, the aquarium should be permanently located before it is filled with water.

Sunlight should not often be allowed to fall directly on it, as it stimulates the growth of algæ, and is liable to overheat the water, the temperature of which should be kept steady, not rising above 70 degrees or falling below 40 degrees. A temperature of 50 degrees to 60 degrees is best, and it should not be allowed to vary. Warm water holds less air than cold water, so that a high temperature is more to be guarded against than a low one.

Water plants are necessary in the aquarium for the aeration of the water, since under proper conditions of light and temperature they give off oxygen which animals require, while the latter exhale carbonic gas. A balance between the animal and plant life of the aquarium is essential for success. Too much plant growth can be checked by reducing the amount of light, which may be shut off by the use of a screen or shade. A greenish film of algæ or confervæ will at times develop rapidly on the glass and obscure the contents of the aquarium. It will have to be rubbed off occasionally, but it is just as well to let it grow on the side next the window, where it will serve to restrict the light and also aerate the water. The growth of algæ is lessened by placing the aquarium in a more shaded position. Snails eat algæ rapidly and should be introduced for that purpose, and also because their eggs serve as food for small fishes.

Allow the aquarium to absorb air from its plant life and from the surface of the water for a day or two before putting in the fishes. The latter should be few in number at first. Snails may be added later. Dealers in aquarium supplies usually keep plants, snails, tadpoles, newts and other small creatures as well as fishes.

With running water, plant life can be dispensed with. A collection of large goldfishes in the New York Aquarium has been kept in good condition for many years in flowing Croton water, enduring its low temperature in winter very well. The fish are, however, much more active in summer and feed more freely.

The following named water plants are those most frequently used by aquariists: milfoil (*Myriophyllum*), hornwort (*Ceratophyllum*), fanwort (*Cabomba*), water-weed (*Anacharis*), tape-grass (*Vallisneria*), arrow-head (*Sagittaria*) and pondweed (*Potamogeton*). Many other species will serve the purpose. Plants may be anchored by pressing them down into the sand or gravel. Thin strips of lead wound loosely about their roots will hold them securely.

In a well-balanced aquarium the water should not be changed at all. It is in fact better without any additions, other than required to replace what is lost by evaporation. Water should never be added until it has been kept in the same room with the aquarium long enough to acquire the same temperature.

In siphoning out water from the bottom of the aquarium to clear off sediment or refuse,

*The care of goldfishes being a subject of constant inquiry, this article has been reprinted from the Bulletin for April, 1907, which has been exhausted.

the water should be saved and strained back. The supply of water may be aerated at times by lifting it with a clean dipper and letting it fall back slowly. A sprinkling can will also serve for this purpose. All vessels and apparatus used in connection with the aquarium should be perfectly clean, and it is well not to put the hands into the water at all. Assistance in the way of keeping the aquarium clean may be had by introducing a few tadpoles and small newts to act as scavengers, but the latter should be of very small size.

The bottom of the aquarium should be covered to the depth of a couple of inches, with fine gravel, or clean white sand in which fishes may rub themselves; it is also essential for the rooting of plants.

There should not be too much animal life in the aquarium. The fewer and smaller the fishes the less likely is the air in the water to became exhausted. Two or three small goldfishes to each gallon of water is a safe rule to go by, if the aquarium is large. If small the proportion must be reduced. The question the aquarium presents, when it has been supplied with water and plants, is simply, how many fishes or other air consuming creatures can be accommodated in the quantity of water available? Overstocking may disturb the balance within an hour.

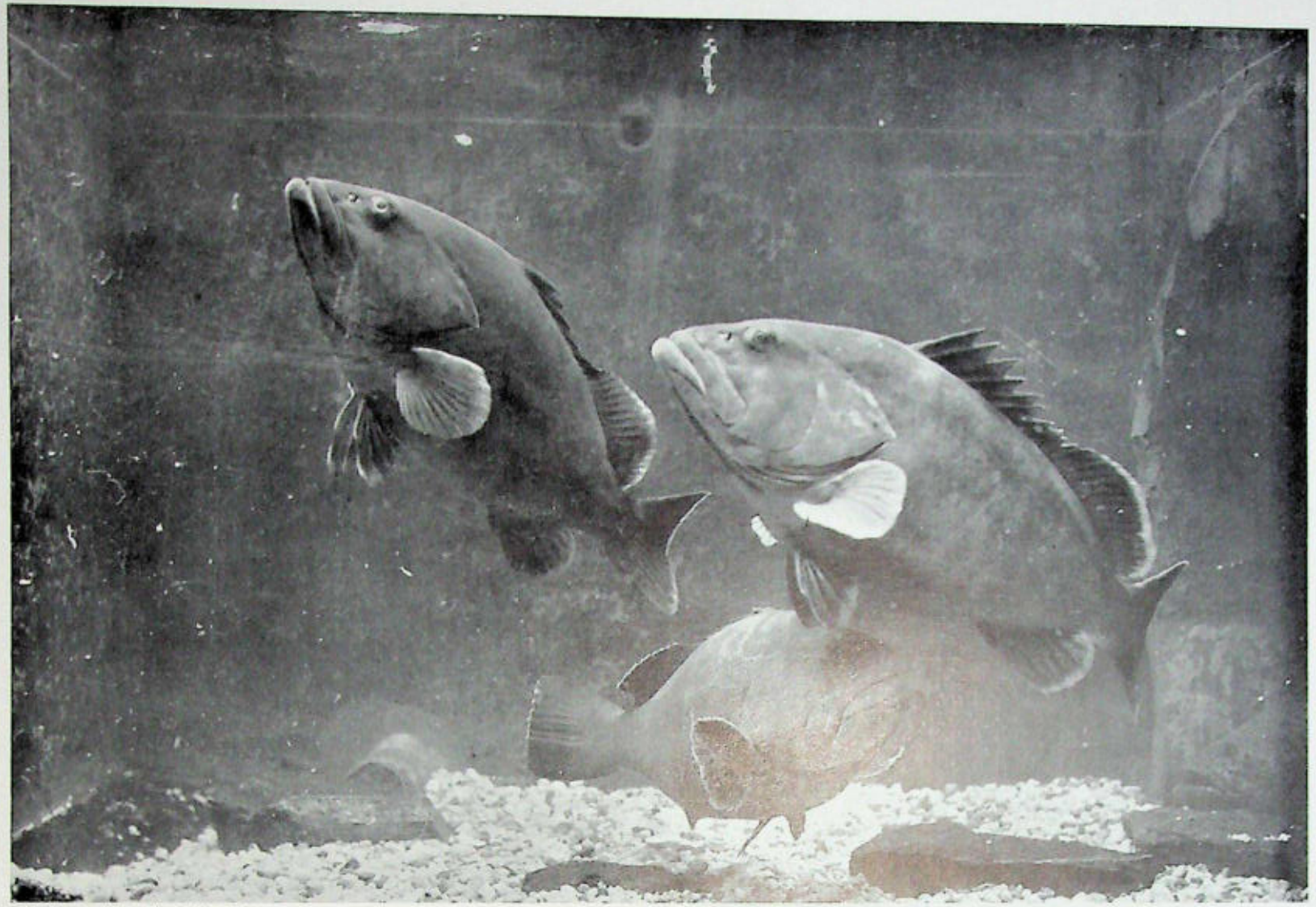
It is probably safe to say that a little neglect in the matter of feeding is better for the permanence of the aquarium than over attention. It must not be presumed that because fishes will live for months without feeding, it is right to treat them in that way. Fishes left without food are simply fishes kept hungry and in a condition of slow starvation, which can only be described as cruelty. When there is a large supply of plants in the aquarium the fishes hold out longer, the very small ones especially getting some nourishment from the young shoots of *Anacharis* and other plants.

Many aquariists feed every day, carefully removing all uneaten food, which soon decays and fouls the water. Wafer food, made of rice flour, and other prepared foods kept by aquaria dealers are safe, and should be supplied at least every other day. Finely crushed vermicelli is also good. Some of the ordinary household cereals are available as goldfish food, but the beginner should experiment with them cautiously. Other foods are, however, desirable at times. Once a week, pieces of very small earth worms, or bits of fresh beef should be furnished. If they can be given to each fish on the tip of a broom straw the chances of contaminating the water by waste food will be lessened. All uneaten food must be picked, dipped, or siphoned out, or foul water and a disturbance of the delicate balance of the aquarium will be the result. A milky appearance of the water is usually a warning against careless feeding. Nearly all diseases which appear among goldfishes indicate that the aquarium needs looking after. The unsightly growths of fungus on fishes, caused by the plant parasites, *Saprolegnia* and *Devoea*, indicate careless handling of the fishes, or bad conditions prevailing in the aquarium. When the conditions are right, diseases are not likely to appear. Too high a temperature favors the growth of fish fungus.

This disease is hard to deal with and infected fishes should be removed at once and kept by themselves, where, under proper conditions, they may possibly recover. A pinch of salt put in the water with them may arrest the disease, but when in bad condition a teaspoon of salt to each gallon of water will be necessary. If other fishes are obtainable, it is just as well to kill diseased specimens, since the fungus penetrates deeply into the flesh and can not be destroyed if the growth is far advanced. Animal parasites on fishes should be picked off after the fish has been carefully lifted in the dip net.

One of the first indications of trouble in the aquarium is the presence of the fishes at the surface with their mouths out of the water, showing that they are suffering for lack of air. The water may be dipped up and allowed to fall back slowly, but the relief afforded will be merely temporary. The temperature of the aquarium should be observed and some of the fishes removed. It may be necessary to increase the quantity of plant-life or stimulate its growth by admitting more light. If the weather is not cold and the window can be opened, air blowing across the surface of the water will be helpful since it may only be necessary to aerate the water and lower the temperature somewhat. There may be refuse at the bottom which should, of course, be removed.

In taking care of the aquarium, a few, simple implements, such as a half-inch rubber tube for siphoning out the water, a glass "dip tube" for removing small particles of dirt from the bottom, a shallow dip net of cheesecloth for lifting fishes, and a cloth-covered pad or rubber scraper with a long handle for cleaning the glass, will be necessary. The dip tube is operated by closing the top opening with the finger to admit or exclude the water as desired. A pair of long wooden forceps and a slim



Photograph by Elwin R. Sanborn

NASSAU AND BLACK GROUPERS, NEW YORK AQUARIUM

stick are also useful for removing plants and other objects without putting the hands into the water.

One other aid in the management of the aquarium should not be overlooked: A reliable book on aquaria and their care is essential, and the amateur will need to refer to it frequently. There are books on this subject to be had at most book stores. The New York Aquarium has published a 63-page pamphlet on *The Care of Home Aquaria*, which will be sent postpaid for 27 cents.

The small aquaria in the laboratory of the New York Aquarium will be shown to visitors making inquiry about them, and their management in detail explained by those in charge.

THE ASCIDIANS OR SEA-SQUIRTS.

By Raymond C. Osburn.

THIS group of animals is distributed all over the world in salt water, and several species are common in this region, yet the average person who finds them seems to have not the slightest idea of what they are, or of their relationships. Some of these are frequently brought or sent to the Aquarium for identification, and the questions which accompany these requests for information are almost as interesting as the animals themselves. "Please let me know what sort of sponge this is and whether it has any value?" "I am told that these things are 'Mother of eels.' What are they and have they any connection with eels?"; "I am told that there is a good market for these things for fish food. What is their value and how are they prepared for market?"; "These things are eating up the piles of my boat dock. How can I get rid of them?"; "What sort of fishes are these? There have been thousands of them washed up on the beach," etc., etc.

However, when we consider that until less than fifty years ago the zoologists were all wrong with regard to the relationships of this group, we may pardon the average person of today for being misinformed concerning them. The older naturalists placed some of them among the sponges, the zoophytes, the mollusca and molluscoidea. The great Cuvier first gave them a class name, *Tunicata*, and placed them intermediate between the *Radiata* and *Vermes* of his classification. It was not until in 1866 that Kowalevsky traced the development of the larva and discovered that the ascidians are, in fact, related to the vertebrates, but that, by a wonderful metamorphosis, the tiny tadpole-like larva becomes transformed into a creature so unlike a vertebrate that its real nature had not been suspected.

The ascidians (*ascus*=a sac), or tunicates, are provided with an outer coat or tunic, secreted by the epidermis, which consists of a substance of the same chemical nature as cellulose, but which, since it is found in animals instead of plants, has received the name "tunicin."

The tunicates fall naturally into three classes: The Larvacea, Ascidiacea and the Thaliacea. The first group includes a very few minute, free swimming forms, which undergo no metamorphosis, and in which, therefore, the larval characters are retained. These forms in the adult stage retain the tail, which is provided with a notochord (the precursor of a vertebral column), a complete dorsal, tubular nerve and gills which open into the pharynx. While of great interest, they are known only to the zoologist, and need not be further considered here.

The Ascidiacea, or ascidians proper, are numerous and widely distributed, occurring from the Arctic regions to the equator and from between the tide limits to great depths of the ocean. Some of them have been dredged from a depth more than three miles. Certain species grow singly, others bud to form colonies, some of these consisting of thousands of individuals. In some cases the individuals are almost microscopic in size, while in others they may reach nearly a foot in length. They may be almost transparent, or brilliantly colored, but frequently they are obscured by a layer of mud or sand adhering to the tunic. On account of the rounded form which many of these animals assume, they were known to the ancients as sea-eggs and they are still so called in many places by the fishermen.

Of the simple ascidians, *Mogula manhattensis* (De Kay) is perhaps the commonest local form. This species is often very abundant about the docks and lives well in the Aquarium, either in the balanced aquaria or in the larger tanks supplied with the harbor water. This is the species charged with devouring the piles of docks, though of course it is perfectly harmless and the real malefactor was merely obscured beneath the layer of the Molgulas attached on the surface. Also, this is the form supposed to have a market value as fish food; etc., though, of course, it has none whatever.

This common Molgula is a small swollen sac, resembling a small bladder, not more than an inch in diameter, and is attached by the tunic at the side opposite the mouth. The mouth

opening leads into a capacious pharynx, provided with numerous slit-like gills. There any microscopic food which the water may contain is separated out and passed into the coiled or looped intestine. A current of water, produced by the action of cilia on the walls of the pharynx, passes through the gill openings into the atrial cavity within the tunic and to the outside by another opening, the atrial pore, which is situated near the mouth. The intestine ends in the atrium near the pore and the current of water sweeps out the excretae. Of course the looped form of the intestine and the position of the incurrent and excurrent openings near together on the upper surface are merely adaptations to the mode of life. The same conditions are observed in the Bryozoa, Sipunculoid worms and numerous other attached and tubicolous forms of animals.

The sex cells, when ripe, may be carried out also by the excurrent stream of water, or, in other cases, the eggs may be retained in the atrial cavity, where they undergo development, and finally the free-swimming larva, resembling small tadpoles, are released through the atrial pore. These swim about for a short time to distribute themselves, and to find some solid substance to which they may become attached by a special adhesive disc and so remain fixed for the rest of their lives. The metamorphosis takes place immediately after they become attached. In this process the tadpole-shaped larva loses the tail and notochord, develops the tunic and takes on the form of the adult.

The tough tunic seems to be an ample protection, for, in spite of their numbers, few animals ever seem to feed on them. Undoubtedly some fishes are able to bite through the tough cover, but they must be disappointed at the small amount of nutriment to be obtained as the result of their labors.

Molgula often occurs in such numbers as to cover the surface of piles, rocks, etc., with a close layer and may be obtained in large quantities for the purpose of study.

A larger form, *Boltenia*, occurs in somewhat deeper water off our coast. This ascidian has a long stalk with a grapple-like expansion at its base for attachment and an oval enlargement or body at the upper end, giving the animal somewhat the appearance of an Indian's warclub, a resemblance further borne out by the size, as it grows to be nearly a foot high. It is often richly colored. When red it is known to the fisherman as a "sea peach," when yellowish, as a "sea lemon."

The compound ascidians are always smaller, and are either developed at intervals on a stolon, sometimes resembling miniature melons on a leafless vine, or they may be closely set and embedded in a jelly-like mass forming a common tunic for the colony. Some of these form considerable masses, either spreading over rocks, shells or piles or sometimes growing erect in masses or strands even to the height of a couple of feet. The colony figured was 15 inches high. The small areas showing on the surface represent clusters of one-half dozen to two dozen individuals. The writer has dredged them up by the bushel from the bottom of Vineyard Sound. These masses are known to the fishermen as "sea pork," or are often mistaken for sponges or what not. Some of the clustered forms were known among others to the ancients as "sea grape" or "sea fruit"—the *"uva marina"* of Pliny. Rondelet, 1554 (*De Piesibus Marinis*, p. 130) and Gesner, 1587 (*Historia Animalium*, p. 1044) figure such a sea fruit or *"uva marina"* which is undoubtedly a colonial ascidian. Pliny is responsible for the remarkable statement,—which one may disbelieve if he chooses,—that sea grapes rotted in wine and drunk cause a loathing of wine thereafter in drunkards on acount of its fetid marine odor. The ancients believed that "like cures like" (*"similia similibus curantur"*) and did not hesitate to apply heroic remedies.

One genus, *Botryllus*, is of frequent occurrence at the Aquarium, growing in a thin layer on the wall of a tank or the sides of a glass jar and occasionally spreading over nearly a square foot of surface. It often encrusts the leaves of eel grass and other sea weeds in shallow water with its slimy layer.

In another species, *Amaroucium pellucidum*, the jelly-like mass is often impregnated with sand to such an extent that it is rendered quite firm. This species was originally described as a bryozoan. The accompanying figure represents a colony six inches in diameter, dredged by the writer in Vineyard Sound.

All together about thirty species of these tunicates occur in the neighboring waters.

The Thaliacea or salps which constitute the third group of the Tunicata are entirely pelagic. While at first they appear to have no similarity to the sessile sea-squirts, the differences can be explained for the most part by the difference in the mode of life. That an animal which spends its whole life time swimming at or near the surface of the ocean must be constructed on a different plan from one that remains in one place attached to the sea bottom seems

axiomatic. Yet that these differences need not be fundamental, is shown by the structure and development of this and the foregoing group of tunicates.

The meaning of the common name "salp" is not clear. The term is very ancient, for Pliny used "*salpa*" in reference to a kind of stockfish (fish dried without salting). Whether the difficulty of getting any nutriment out of this sort of stockfish, which had to be soaked and beaten before it could be eaten, led to the term "salp" being facetiously applied to these tough and innutritious pelagic tunicates seems at least a possible interpretation.

The individual salp resembles a miniature cask with both ends knocked out. The wall consists of the tough transparent tunic, through which appears a series of circular muscle bands resembling hoops, which are, however, on the inside instead of outside. The open ends are necessary to the mode of locomotion, which is altogether unique. Water is taken in at the anterior aperture and a wave of constriction runs over the circular muscles, each in turn narrowing the diameter of the tube and forcing the water backward and out of the posterior opening. This process causes the salp to move slowly forward, much as though it were actually drinking its way through the water. In its course through the body the water passes over the gills and supplies oxygen, and food is also removed and carried into the intestines by the action of cilia.

These animals are occasionally so numerous in the summer months that they seem to fill the ocean for many miles, so that dozens or even hundreds may be dipped up with every bucket of water. Sometimes they are thrown on shore in countless numbers. They are often highly phosphorescent.

Our commonest species in this region is *S. zonaria—cordiformis*. As a rule the salps are about an inch or so long by nearly half as broad. One larger species, *Salpa tilesii—costata* reaches a length of eight or ten inches and appears to be rare. A single specimen from Matinicus, Me., sent to the Aquarium last year for identification, was taken in a lobster pot at a depth of 20 fathoms. This is much farther north than it has hitherto been reported on this coast.

Among the interesting features of this group is a peculiar mode of reproduction by alternation of generations. There are two types of individuals, usually quite unlike one another, so that in most cases they were given different names before their connection was suspected. The hyphenated specific names, like those given above, are not therefore indicative of aristocracy, though the salps are no doubt a very ancient family, but merely show that these names have been applied to the two generations of the life cycle. One of these, the solitary generation, occurs singly, and reproduces asexually by forming a string of buds, which develops into a string of aggregate or chain salps. These, which form the second or sexual generation, are attached side by side, often in long strings looking like well-filled, transparent cartridge belts. Each individual of the chain develops sexual organs and produces eggs which may give rise to tadpole larvae or may develop directly into the adult solitary asexual form. Reproduction goes on with great rapidity in the warmer months, hence the appearance of enormous numbers in middle and late summer.

Porpoises.—At one time in the month of October the Aquarium had in the building specimens of three different genera of porpoises, two of them alive and on exhibition, the third having arrived dead. One of these was the fine *Tursiops* eight feet long, received from Hatteras, N. C., in November, 1913; another, a *Delphinus* seven and one-half feet long from Seaside Park, N. J., and a *Phocæna*, four feet long, from Provincetown, Mass.

The *Delphinus*, like other porpoises captured by fishermen, did not live long. The *Phocæna*, called harbor porpoise, is the smallest of the porpoises which inhabit our coast, seldom exceeding five and one-half feet in length. It is also the commonest, entering harbors freely, where it is often called "herring hog" and "puffing pig."

It is a pleasure to record again the good health and liveliness of our bottle-nose porpoise (*Tursiops truncatus*), which has now completed its fifteenth month in the building.

We are unable to detect anything like discontent in its conduct and have never had a more expensive boarder. It consumes twenty-five pounds of fish a day, and would take more if supplied. Whatever the market affords cheapest, butterfish, weakfish or herring, is taken promptly, provided it is fresh.

We have watched this endurance test of the porpoise in captivity with great interest and not without misgivings. It is most gratifying to see this ranger of the ocean adapt himself to restricted quarters with apparent contentment.

C. H. T.

ZOOLOGICAL SOCIETY BULLETIN

Departments:

Mammals
W. T. Hornaday.

Birds
C. William Beebe.
Lee S. Crandall.

Aquarium
C. H. Townsend.
Raymond C. Osburn.

Reptiles
Raymond L. Ditmars.

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Elwin R. Sanborn,
Editor and Official Photographer

Vol. XVIII. No. 2. MARCH, 1915

ROSWELL MORSE SHURTLEFF.

Mr. Roswell Morse Shurtleff, a member of the Aquarium Committee of the New York Zoological Society, died January 6, 1915, at the age of seventy-five.

Mr. Shurtleff was a member of the National Academy of Arts, of several clubs and societies in New York and a veteran of the Civil War. He had been a member of the Aquarium Committee since 1902.

PROFESSOR L. L. DYCHE.

We regret to have to report the death of Prof. Lewis Lindsay Dyche at Topeka, Kansas, on January 20, at the age of fifty-nine years.

Prof. Dyche, in addition to his duties in the State University of Kansas, was also State Game and Fish Warden and devoted his attention especially to experiments in the pond culture of fishes under the conditions existing in Kansas. In this work he had great success. Bringing to this field of effort a wide experience in the study of animals and a keen insight into the nature and limitations of the work, he was able in a short time to secure astonishing results.

The particular problem in which he was most interested was the creation of fish ponds that would yield a maximum of food fish at a minimum of expense and care. His idea was to give the Kansas farmer something that he could use to advantage and that would be a source of income instead of an interesting plaything.

He was a regular attendant at the meetings of the American Fisheries Society, and the reports of his work and experiments were always received with the greatest enthusiasm. The extensive State fish-cultural ponds at Pratt, Kansas, are a monument to his energy and interest in this work. His death is a great loss to American fish-culture and his place will not readily be filled.

THE AMERICAN FISHERIES SOCIETY.

This Society has been doing splendid service along all lines of fisheries work for forty-four years and deserves the support of everyone interested in any branch of fisheries or aquatic biology. It has been active in securing the passage of laws for the protection and propagation of aquatic animals and its annual volumes of transactions are a mine of information on all branches of the work with which they deal.

The transactions for the past forty-three years have been issued in the form of an annual volume, but they will henceforth appear quarterly under the editorship of Dr. Raymond C. Osburn of the Aquarium. The first number of the new quarterly (Vol. 44, No. 1) bears the date December, 1914.

A complete index to the first forty volumes of the Transactions of the Society has been prepared by Mr. Daniel B. Fearing, of Newport, R. I., and this will be published shortly by the Society. This will be of great service to all those who find it necessary to examine the literature of fisheries work covering the years from 1870 to 1910.

The Society enrolls among its members practically every working fish-culturist in the United States and Canada, besides many zoologists of the various universities and others interested in fish and fisheries. At the last meeting, held in Washington, D. C., thirty-four papers were presented, besides motion pictures illustrating methods of fish-culture and the results of conservation and protection.

Mr. Daniel B. Fearing of Newport, R. I., was elected President; Prof. Jacob Reighard of the University of Michigan, Vice-President; Mr. C. W. Willard of Westerly, R. I., Treasurer; Dr. Charles H. Townsend, Director of the New York Aquarium, Corresponding Secretary, and Dr. Raymond C. Osburn, also of the Aquarium staff, was re-elected Recording Secretary.

A New Work on Medical Entomology.—In a Handbook of Medical Entomology recently published by Profs. Riley and Johanssen of Cornell University (Comstock Pub. Co., Ithaca, N. Y.), one is not surprised to find that those noxious insects which are aquatic in the larval stage, namely, the mosquitoes, black flies and horse flies, are given considerable attention. The portion of the text dealing with these pestiferous aquatic insects amounts to about 70 pages in a total of 256 of descriptive matter. The relation of these pests to such diseases as malaria, yellow fever and filariasis is fully discussed, together with the methods of avoiding and controlling outbreaks of these diseases and of the insects by which they are communicated to man.

Other noxious insects, as well as mites, ticks, etc., are given the same careful treatment. The descriptive matter is followed by keys for the identification of these "hominoxious arthropods" and by an excellent bibliography.

The control of epidemic diseases can be satisfactorily accomplished only with the co-operation of the general public, but the public is not readily interested in matters which it does not understand. Much has already been done to familiarize the people with the dangers and the possibility of control of these insect disseminated diseases, but there is still much to be done along this line and the above-mentioned work will find an important place in supplying information. It is so clearly and simply written that one need not be an entomologist nor a physician in order to appreciate the value of the study of these pests and the necessity for controlling them. R. C. O.

A NEW SPECIES OF FISH.

The New York Aquarium has again exhibited in its collections a species of fish new to science. The species in question belongs to the sea-bass family, *Serranidae*, and was brought to the Aquarium in a small collection from Key West, Florida, by Mr. S. Greenlee, of the Mallory Liner *Comal*.

It was first taken by a Key West fisherman, by whom it was held in captivity for some time before Mr. Greenlee obtained it. As a result it was in poor condition when it reached the Aquarium and lived only twelve days after it was received on December 26, 1914.

It was recognized at once as belonging to a new species and a description of it has already been published under the name *Dermatolepis marmoratus*, by Dr. Osburn and Mr. Mowbray of the Aquarium staff in *Zoologica*, Scientific Contributions of the New York Zoological Society, under date of February 25, 1915.

The genus *Dermatolepis* is found only in the warmer marine waters of America; two species being hitherto known on the Atlantic and one on the Pacific coast. The only well known species is *D. inermis*, which is fairly common at Bermuda and is an excellent food fish. It lives in holes and crevices in the rocks at the depth of several fathoms and is very shy; darting out after its prey and returning at once to its retreat.

We have no knowledge of the habits of the new species, *D. marmoratus*, as only the one specimen is known. The type, which was twenty-four inches long and weighed nine and a half pounds, has been deposited in the collections of the American Museum of Natural History. The specific name *marmoratus* refers to the marbled coloration of the body.

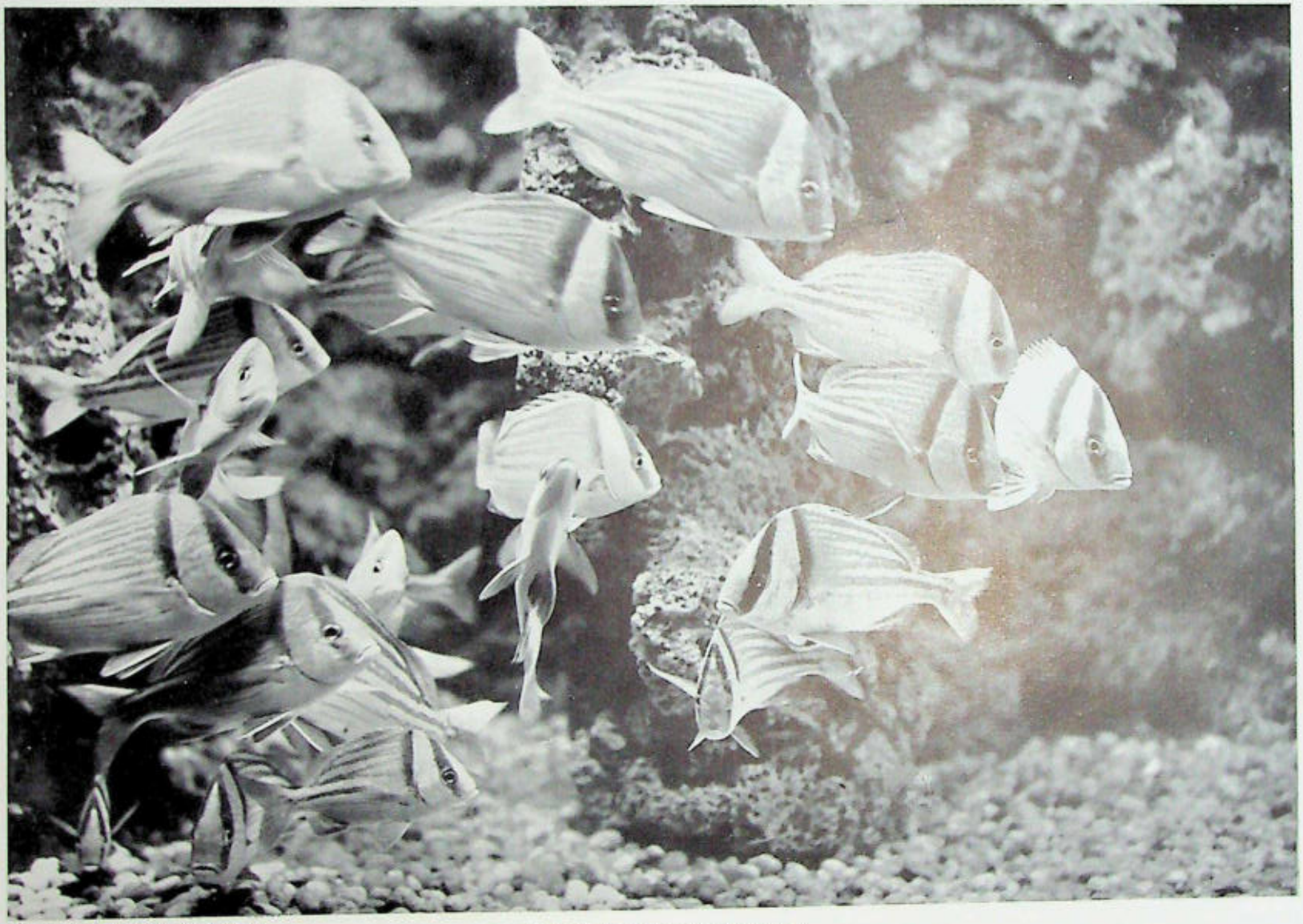
Other species described from the Aquarium are *Hippocampus kincaidi*, a new sea-horse from Bermuda, described by C. H. Townsend and Thomas Barbour (BULLETIN No. 22, p. 305, July, 1906) and *Angelichthys townsendi*, a new angel fish from Key West, Florida, described by John T. Nichols and L. L. Mowbray (*Bulletin* of the American Museum of Natural History, Vol. 33, Art. 37, pp. 581-583, Oct. 8, 1914).

NEW FISH PHOTOGRAPHS.

Mr. E. R. Sanborn has recently made a series of excellent photographs in the Aquarium, three of which, Calico Bass, Porkfish and Nassau and Black Grouper are reproduced in this BULLETIN. Others will be published from time to time.

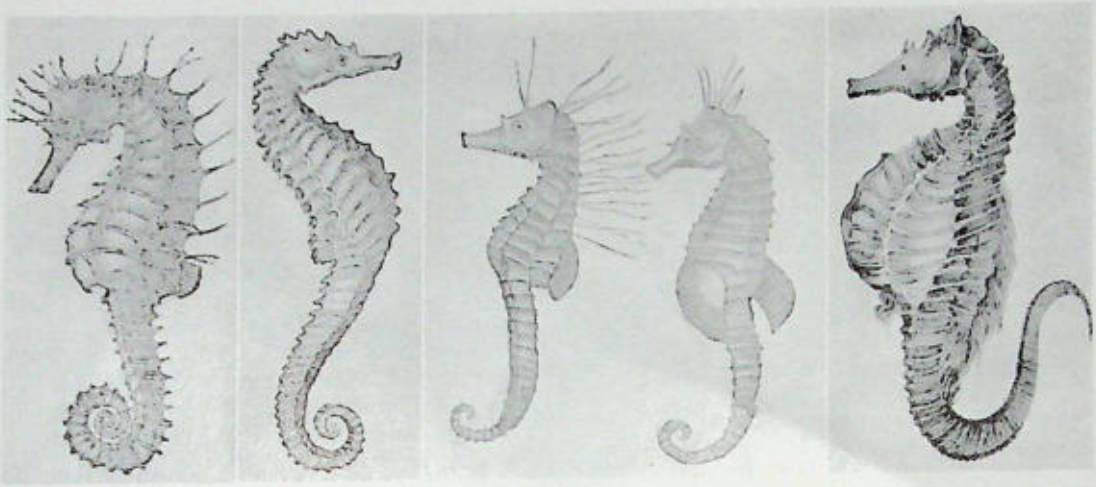
The photograph of a school of Calico Bass (*Pomoxis sparoides*) is the best picture that has yet been made in this dark building. The detail is sharp enough to permit the counting of fin rays in most of the numerous specimens shown. It is seldom that every fish in the tank can be caught clearly on one photographic plate.

Mr. Sanborn's excellent photographs made in the Zoological Park and the Aquarium have long been familiar to readers of the BULLETIN.



Photograph by Elwin R. Sanborn

PORKFISH: NEW YORK AQUARIUM



RONDELET, 1554 GESNER, 1587 MOUFFET, 1634 GOLDSMITH, 1822

THE SEA-HORSE IN ANCIENT HISTORY.

By Raymond C. Osburn.

THESE strange little fishes apparently interested mankind in former centuries as much as they do at present and nearly all the older naturalists had something to say of them. To be sure, they knew but little about them, but lack of knowledge is not necessarily a hindrance to a writer, and apparently their ignorance only gave freer rein to their imagination.

For one thing, they could not make up their minds where to place it, and as the term "fish" was applied to nearly all aquatic animals, as it often is today, it is not possible to determine just what they thought of its relationships. Rondelet (*De Piscibus Marinis*, 1554) does not discuss it with the other fishes, but places it between a crustacean and a starfish, in the section on "Insects and Zoophytes." Gesner (*Historia Animalium*, 1587) gets around all the difficulties of classification at once by arranging all the aquatic animals in alphabetical order, so in this work *Hippocampus* appears between another fish, *Hepatus*, and the Hippopotamus.

The accompanying illustrations are taken from the works of Rondelet and Gesner mentioned; from Mouffet (*Theatrum Insectorum*, 1634), and from Goldsmith's "Animated Nature," edition of 1822. All of these are good for their time, but no particular advance in the interpretation of their structure is shown. In fact, the figure from Goldsmith, while much the finest plate, is poorer in other respects than Rondelet's as the filaments are not shown and the dorsal fin is exaggerated to resemble a horse's mane. Mouffet shows both sexes, but, as far as I have been able to discover, he gives no discussion, so it is impossible to tell whether he considered them different kinds or whether he meant to show the sexes (the fact that the male carries the egg-sac, being liable to misinterpretation on this point).

It is amusing to note that the older writers were much concerned with the poisonous qualities (!) and the medicinal virtues (!) of the sea-horse. Thus Rondelet devotes the major portion of four quarto pages (in Latin of course) to a discussion of these matters. He gravely quotes from the Greek writer Dioscorides (first and second centuries A. D.) and from the Roman Aelianus (third century A. D.) and others, the interesting information that the ashes of the sea-horse, administered in wine, produce spasmodic coughing, hot flushes in the head, discharges from the nostrils of a fishy odor, swelling of the abdomen, and eventually death. If perchance any should recover, such persons have ever afterward a strong desire for the proximity of the water and for continual bathing.

Used as a medicine, however, the ashes of the sea-horse mixed with oil of marjoram or with liquid pitch and rubbed on cures baldness of the form known as alopecia, while mixed with water it is a cure for canker and leprosy. Administered internally it counteracts the poison (*sic*) of the sea-hare, and is a sovereign remedy for the bite of a mad dog!

How such peculiar notions with regard to these dainty little fishes could arise is a matter

of conjecture, but they are of a nature with other statements concerning the qualities of the other animals and plants known to the ancients, especially when they were rare or of unusual form.

The name *Hippocampus*, by which this fish was known to the ancient Greeks and which was borrowed by the Romans, and which is now used as the scientific name of the genus, is not to be translated "sea-horse." Instead it is a combination of two Greek words, the first of which means horse and refers to the body, which is like the head and neck of a horse, while the latter part of the word means a worm or some sea monster and refers to the tail. Rondelet and other older writers go very fully into the derivation of the name, apparently to prove to their readers that the *Hippocampus* is not to be confused with the mythical sea-horse with the tail of a dolphin, such as Neptune drove to his chariot and which was written about by the classical Greek authors.

The name "sea-horse," or rather its equivalent in the languages of various Mediterranean countries, was in use in the middle ages. *Cheval marin, chaval, chevalot* were in common use, as were also a number of other names meaning sea dragon, and sea salamander, sea cock and the like.

THE CARE OF YOUNG ALLIGATORS, POND TURTLES AND TORTOISES.*

By C. H. Townsend.

YOUNG alligators do not thrive in the hands of the amateur, especially in winter, if one may judge by the number of emaciated specimens annually presented to the Aquarium.

The returning Florida tourist usually has some baby alligators, which refusing to feed in our chilly northern climate, are brought to the Aquarium, perhaps during intensely cold weather, in nothing warmer than a pasteboard box. If this last thoughtless act does not finish them at once the attendants are usually able to pull them through with the aid of warm water. Cold-blooded reptiles, such as alligators and turtles, must have warm quarters. They should be kept in aquaria or other vessels into which sunlight can enter, and the vessel placed where it will not become cold. If kept near a window for the benefit of the sunshine, which is life to them, care should be taken that they are also near a heater.

The temperature of the ordinary living-room in winter is scarcely high enough to keep alligators active, since they need a warmth of 75 to 85 degrees, a higher temperature than the human habitation should have. They require not only warm water, but a place where they can crawl out at times. The water need not be more than a few inches deep, and the platform or small log on which they rest should be placed in such a way that they can climb upon it easily. Alligators in captivity are most comfortable and active when they have access to water that is nearly tepid, and it is their habit to float much on the surface. Pond turtles require not only warm water, but also the heat of the sun. For that reason turtles do not flourish as well in the New York Aquarium as they would in a building more accessible to sunshine. The temporary warming of torpid alligators or turtles in boxes set near a heater is useless. If they can not be kept where both air and water are permanently warm, they should be dispensed with.

The numerous chilled and weak alligators sent to the Zoological Park each year, are placed in the sunny Reptile House in a tank of water with a steam pipe in it. After a thorough warming up in water of 80 to 90 degrees temperature, they begin to feed, and in three years will be a yard long, and weigh twelve or fourteen pounds. The State of Florida is making a mistake in allowing the present heavy export of young alligators, which are practically all lost by being carried north. Large alligators are now scarce, and the supply of alligators for leather is almost exhausted.

Since alligators and turtles do not feed unless kept permanently warm, it is necessary to first provide them with quarters where they will have a temperature of certainly not less than 75 degrees of both air and water, and the temperature should really be higher. They should also have the benefit of sunshine. Forcing cold alligators to eat by cramming food into their mouths is admissible only temporarily. They will eat freely when the water and air are warm enough, and will grow amazingly. They eat such a variety of foods that it is easy enough to provide for them.

Alligators and snapping turtles are flesh eaters and may be provided with small minnows, frogs, tadpoles, worms, grubs, crayfish, shrimps, and small crabs, either dead or alive. When these can not be had, they will eat fresh chopped meat, fish, clams, and oysters. Many

*The care of these animals being a subject of inquiry at the New York Aquarium, this article has been reprinted from the Bulletin for April, 1907.

kinds of turtles will eat all the above named foods, as well as snails, small aquatic mollusks, and insects. Others like very tender, green vegetables, such as tomatoes, lettuce, celery, and various water plants. The food of some species consists largely of the bulbs of sedges, (*Cyperus*), while with others it is chiefly small water mollusks.

Some of the turtles are active fish eaters, and will do well if supplied with live minnows. The wood-"turtle" and other species which forage on land as well as in the water, are fond of berries, mushrooms, and many kinds of fruits and vegetables, while nearly all kinds will eat grubs. The box tortoise eats berries, mushrooms, and some garden vegetables as well as grubs and worms.

Turtles should be provided with a variety of foods until the kinds suited to each species are ascertained. Some species of turtles feed only under water, consequently it is absolutely necessary for them to have access to water when they are fed.

If their surroundings can be made to approach natural conditions—that is, if they can have access to a compartment in their quarters where there is dry sand, earth and sods, where grubs, worms, and other food can be thrown in abundance—success in keeping them will be more likely to follow. And it is remarkable how quickly they learn the exact location of food and drink. Once fed in a certain location, they will invariably seek that place when urged by hunger.

A SEARCH FOR GIANT GARS.

By L. L. Mowbray.

IN April, 1914, the writer left the New York Aquarium for the Lower Mississippi to make a collection of the fishes of that region, particularly the large gars and catfishes which are to be found in the largest numbers in the states of Mississippi and Louisiana.

There are many places where the gars can be taken, but the most essential point was to secure the specimens as near a railroad station as possible, the journey back to the Aquarium being a long one at best.

Maddox, on the Yazoo Pass, Mississippi, was selected owing to its proximity to Moon Lake, where Mr. Ira E. McGehee makes his headquarters in carrying on a fishery industry. The principal feature of the work is the taking of the spoon-bill catfish (*Polyodon spathula*), the eggs of which are used in the preparation of caviar.



GIANT GARS, YAZOO PASS, MISSISSIPPI

On arrival at Maddox the fishery was found to be concluding for the season, but on learning that the Aquarium was desirous of procuring a collection for exhibition purposes, Mr. McGehee kindly offered his services and equipment and immediately set to work locating large gars. He stated at the outset, however, that it was too late in the season and that the gars, if taken, would be very weak owing to their having spawned.

The great gar (*Lepisosteus tristoechus*) represents a very interesting family of fishes and the floor pools of the Aquarium present a very good opportunity of exhibiting it. If specimens are once located safely at the Aquarium it should be a matter of little effort to keep them. The long and short nosed gars, which are exhibited in the wall tanks on the fresh water side of the building have been in captivity for twelve years and with sufficient space for free movement the keeping of the giant gars of the Mississippi would be compartively easy.

Several weeks of continuous fishing were spent in every known locality of Moon Lake, in an endeavor to secure a good supply of giant gars, but on the second or third day after capture they would either succumb or become too weak for shipment.

Mr. McGehee and his men, who are trained in handling the fishes of that region, used every effort possible to keep the fishes with sufficient vitality to warrant the trip north but failed. After having tried repeatedly, without success, to secure the gars, the writer started for New York with a good collection of small fishes from the Moon Lake region, which seemed to be in



Photograph by Elwin R. Sanborn

CALICO BASS: NEW YORK AQUARIUM

great abundance in the lake. Four varieties of sunfishes, yellow bass, rock bass, white perch and mud fish, as well as turtles that had been taken in the various hauls of the seine and held in live cars awaiting shipment were included. Specimens of the large alligator snapping turtles which are found in this region were also sent to the Aquarium and still remain interesting members of the collection. The long-nosed gars (*Lepisosteus osseus*) were taken in almost every haul and were more easily handled and lived much better in the live cars than did the giant gars.

It was brought to the attention of the writer by several of the fishermen in the locality that gars were known to have been dug up in the mud and that, when the caked mud was washed off, were found to be in good condition. Availing myself of this information I packed a gar, encased entirely in mud, in a box just a trifle larger than the dimensions of the fish itself. This was shipped to the Aquarium, but on arrival was found to be dead and from all appearances had been dead for some little time. It may be that the fish has to accommodate itself naturally to this comatose state. However, the mud had settled during shipment and a part of the animal was exposed. This may have had something to do with the defeat of the experiment.

There was no difficulty in locating the gars, owing to their habit of rising to the surface and taking in air which is liberated in bubbles at intervals, after the gars have gone down into deeper water. Walking slowly along the shores of the lake one can watch for the bubbles rising to the surface and thus follow the track of the gars. This method of locating giant gars seems to be never failing and obviates many fruitless casts.

Some specimens were taken which measured over eight feet, but it was very difficult, after capture, to keep them alive in the live-cars as they were much weakened by the terrible fight which they put up in their capture. Many sets of the net were made and a number of gars encompassed but repeatedly they would bite their way through the seine.

The seine in which the gars are captured is two and one quarter miles long, made of thread about $\frac{1}{8}$ of an inch thick, woven in meshes of about four inches and is used for the capture of spoon-bill catfishes. The net is laid out from a small barge or scow which is towed by a motor boat and reaches across the lake and back, making a spread of about one quarter of a mile. It is drawn in by motor power and eight men are required in laying it out and drawing it in; which operation takes about three hours.

When the specimens are encompassed and the net drawn in, a large dory is filled with water and held at the outside of the net, the side of the dory being pressed down under the water so that the giant gars can be rolled into it from the net to avoid possible bruising. The water is frequently renewed in the dory, and the gunwale is kept about six inches above the surface and attached to the scow until the day's fishing is completed. The gars are taken to a mooring and either placed in a live-car or held in the dory until shipped, in which case the water has to be frequently changed to prevent it becoming too warm. The changing of the water, however, has very little to do with the keeping of the gars as they continually rise to the surface for air, but sufficient room is necessary to permit the specimens to rise and return comfortably.

On examining the stomachs of several alligator gars I found calico bass, small buffalo fishes, white perch, sunfishes and frogs. The above varieties seem to be their principal diet.

The gar has very strong jaws—so powerful in fact that when it seizes the net, with a vigorous twist of the body it can go completely through it; tearing a hole of sufficient size to allow its escape. The negroes engaged in the work at Moon Lake claim that an infuriated gar has a strength of twenty horse-power, and when we take into consideration that the net through which he can go so easily is made of tarred cord almost an eighth of an inch in diameter, this contention has some basis of fact.

AQUARIUM NOTES.

Tarpon from New York Bay.—During the summer the Aquarium exhibited two living tarpons about four and a half feet in length, which were captured in pound nets at Belford, N. J., in the lower part of New York Bay. Both specimens were injured in capture and neither lived as long as two weeks. The average commercial fisherman is not a good collector of live specimens and seldom handles fishes with the care necessary to insure satisfactory living exhibits. The trained Aquarium collector can bring hundreds of fishes from Florida or Bermuda with a loss in transit of little more than five per cent. and the specimens often live in captivity for several years.



THE DETROIT AQUARIUM

It is not uncommon for the tarpon to wander northward late in the summer and stragglers are taken in pound nets in Long Island and Massachusetts waters nearly every year.

Manatee From Porto Rico.—The Aquarium received on August 31, a manatee (*Manatus latirostris*) from Porto Rico, as the gift of Hon. John A. Wilson of San Juan, Porto Rico, who also secured free transportation for the specimen from the New York and Porto Rico Steamship Company.

Unfortunately the manatee was injured in capture and did not live quite three weeks. Although supplied with brackish-water eel-grass, a food on which the manatees formerly kept at the Aquarium fed freely, it ate but little. One of the manatees received from Florida lived in the Aquarium seventeen months.

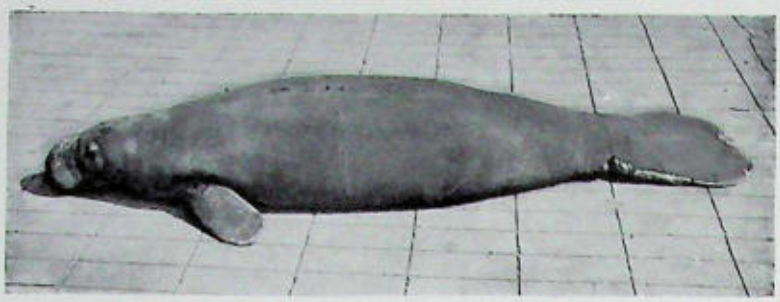
The manatee from Porto Rico has been presented to the American Museum of Natural History in Mr. Wilson's name. It was seven feet seven inches long and weighed four hundred and thirty-seven pounds.

The Detroit Aquarium.—The Aquarium which was completed in 1904 took its place at once as the most popular museum of the city. Its attendance has always been large; for the past five years the annual number of visitors has exceeded nine hundred thousand and in 1911 exceeded one million.

The Detroit Aquarium is situated in Belle Isle Park. The building is 260 feet long and 72 feet wide. It contains 44 glass-fronted exhibition tanks and three floor pools, and has reservoirs holding 22,800 gallons of stored sea water which is used as a permanent supply. The tanks contain both marine and fresh water exhibits.

For the accompanying photograph, the BULLETIN is indebted to Mr. Conway who is in charge of the Detroit Aquarium and who was formerly on the staff of the New York Aquarium. In the BULLETIN for March, 1914, will be found a photograph of the New Boston Aquarium. The public aquarium idea is taking hold, and municipalities all over the country have applied to the New York Aquarium for plans and methods of construction.

The Economic Value of Amphibians.—In the *Zoological Bulletin* of the Division of Zoology



MANATEE (*MANATUS LATIROSTRIS*) FROM PORTO RICO

of the Pennsylvania Department of Agriculture, May-July, 1913, Dr. H. A. Surface has collected a large number of observations on the food and habits of the thirty species of amphibians known to inhabit that State. The pamphlet also contains descriptions and numerous illustrations, but is especially devoted to the study of the useful qualities of these animals. The data on the food were collected from the examinations of the stomach contents and in the more common species large numbers were examined.

As was to be expected all the species are largely insectivorous, but many of them also eat earthworms, a few are cannibals, and some of the larger species such as the hellbender and the bullfrog may devour fishes, crayfishes and other larger animals. The bullfrog especially has a wide range of diet and will apparently eat anything that it can swallow—mice, birds, crayfish, fish and small turtles are devoured, as well as other amphibians and larger numbers of all sorts of insects.

Attention is called to the fact that none of the amphibia are poisonous in any way, that any of them that are large enough are good to eat, and that all are beneficial to a greater or less extent.

The paper is written in a very popular style for distribution among the people of the State; but this does not detract from its value to the scientist, who will find it of interest on account of the notes on food, enemies, habits, reproduction and distribution.

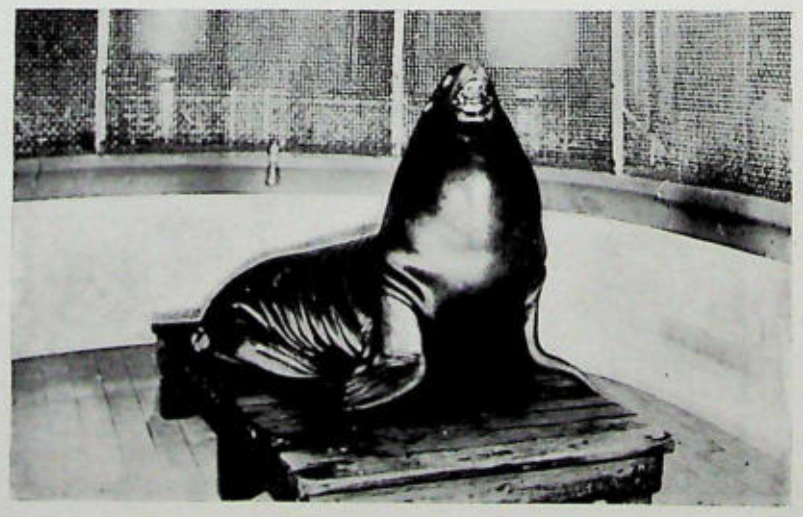
Another somewhat similar paper, though less concerned with the economic phases of the subject is found in the Michigan Geological and Biological Survey, 1912. This paper, The Amphibians of Michigan, by Crystal and Helen Thompson, deals with the eighteen species of amphibians inhabiting Michigan, and discusses the habits, habitat, and other matters of interest.

R. C. O.

Reception at the Aquarium.—The reception held at the Aquarium last May was so well attended that the Executive Committee has selected the first Monday in May as the date for a reception to be held there annually. More than 600 members of the Zoological Society were present to enjoy the occasion. There were floral decorations, motion pictures, refreshments and music, in addition to the regular exhibits of the place. Indeed some of the younger people were dancing before the evening was over. They said the floor was perfect.

For the coming reception on May 3, special efforts will be made to add to the attractiveness of the exhibits and to provide a program that will exceed that of last year in interest.

The attendance at the Aquarium has fallen off to some extent since the commencement of the war in Europe. It is reported that other museums of the City have also had fewer visitors.



OUR OLD SEA-LION



Imbert Del. Nami Mauzerk Sc.

LANDING OF GEN. LAFAYETTE,
At Castle Garden, New-York, 16th August 1824.

Sandfish or Whiting.—This species, (*Malacanthus plumieri*) was brought to the Aquarium for the first time in October, 1914, from Key West, Florida, where it is called sandfish. It is known by the name of whiting in Bermuda.

The whiting lives on grassy bottoms, making conspicuous tunnels into the eel grass, which may be clearly observed through a water-glass.

The tunnels are from five to ten feet long and have a diameter of four to eight inches. The fishes rest in them with their heads protruding. They are best taken by trolling and are very often caught at night.

The whiting is a very good food fish and reaches a weight of twelve or fourteen pounds in deep water. It attains a length of over three feet, but averages about half that length. The most effective bait for taking it in Bermuda is the spiny lobster or salt water crayfish and the fish is gamy and a good fighter. The usual coloration of the whiting is a rich olive green; the tone of the eel grass in which it lives. At times it exhibits a black band between the eye and the snout.

Its habit is to lie quietly, but when alarmed it moves with wonderful rapidity.

L. L. M.

An Old Print.—Old prints of the Aquarium building, formerly called Castle Garden, turn up from time to time and are usually purchased for the Aquarium library. The oldest so far received is reproduced in this issue of the BULLETIN and shows the landing of Lafayette in 1824. The tower at the extreme right of the picture appears only in the oldest of the views of the Battery that are known.

A Hardy Sea Lion.—The large California sea lion, (*Zalophus californianus*) in the Aquarium was received in October, 1907, and has therefore lived indoors nearly seven and a half years—the Aquarium's best record for mammals.

The animal has always been very active, a habit quite necessary for aquatic mammals if they have to live in a building no better lighted and ventilated than the Aquarium.

This sea lion is a well behaved specimen of his species, playful enough to entertain visitors and not given to noisy barking. His tendency to fatness which might result in laziness and inactivity, is controlled by careful feeding.

Believed to be about two years old when received, his present age is not far from ten years.

C. H. T.



BLUE GOOSE

ZOOLOGICAL SOCIETY BULLETIN

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PORTRAIT OF A LIONESS. BY ROSA BONHEUR

Presented to the Gallery of Animal Paintings of the New York Zoological Society

By Mrs. Frederic Ferris Thompson

ZOOLOGICAL SOCIETY BULLETIN

Published by the New York Zoological Society

VOL. XVIII. MAY, 1915. NUMBER 3

A WONDERFUL CAMERA JOURNEY THROUGH CENTRAL AFRICA*

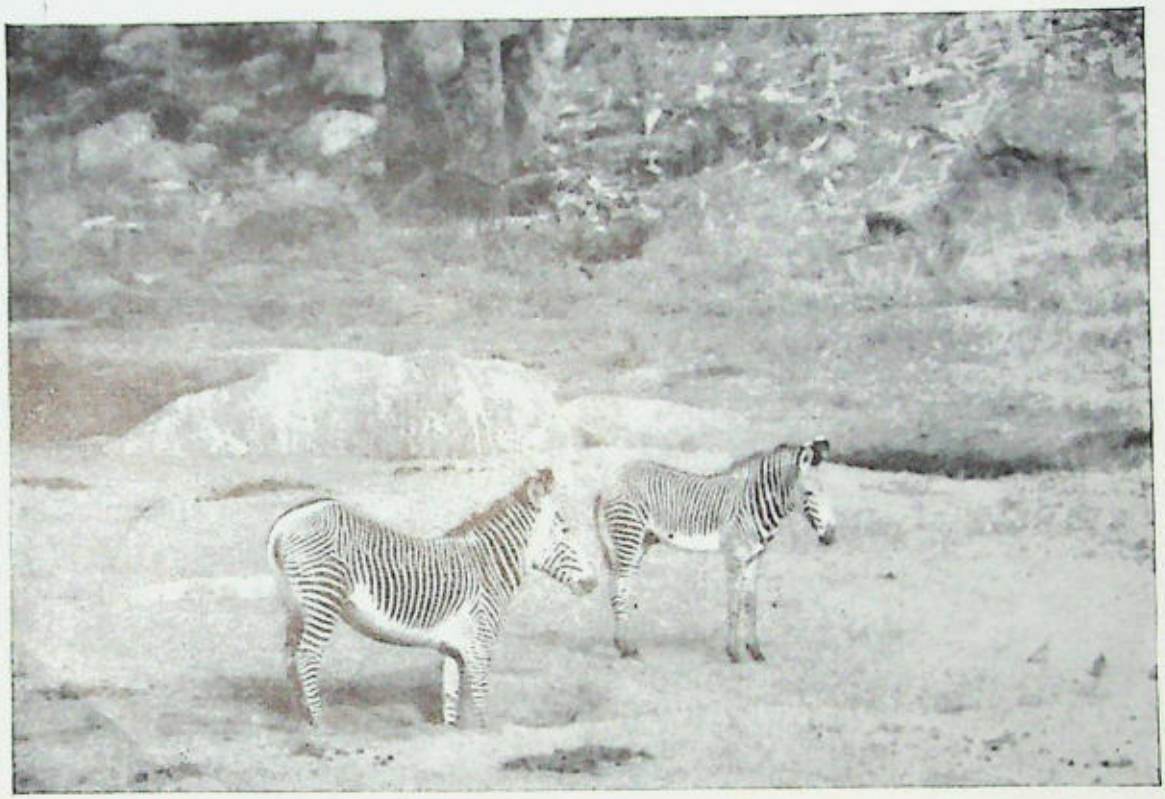
IN April, 1913, Mr. James Barnes, accompanied by Mr. Cherry Kearton, started from Mombassa in British East Africa, on the shore of the Indian Ocean, and in May, 1914, reached the mouth of the Congo River on the Atlantic shore. The year's trip, covering nearly four thousand miles, included a two months' sojourn in the little-known and still unmapped country up toward the Abyssinian border, many excursions through the hunters' paradise of British East Africa, a six weeks' march through Uganda, and thence traversing the northernmost spurs of the Rewenzori range, across the Semliki River into the Belgium Congo territory. From here the journey led down the Ituri and Aruwimi Rivers by forest trail and canoe, to the Congo. A great part of the route covered by the expedition of which Mr. Barnes was the head, followed the trail of the great explorer, Stanley, who in 1888 came in from the westward on the famous expedition to the relief of Emin Pasha.

It was the intention of the Barnes-Kearton Expedition to bring out motion pictures of the native and animal life of this central portion of the great continent; a task that from the outset presented many difficulties. Only by careful preparation were these difficulties to be overcome. There was much to be thought out—much to be studied—for aside from the hardships incidental to such a journey there had to be combatted from the very outset those two great enemies of photography in the tropics, heat and humidity. The most carefully selected material and the most skilfully constructed cameras would count for nothing if by carelessness or oversight the preservation of the films were neglected.

Water tight steel boxes lined with pasteboard and felt were constructed in London and these again were surrounded in wooden cases with a padding of heavy blanketing to keep out the heat; and so successful were the preparations that there was a loss of scarcely five per cent. of the exposed film. Three moving picture cameras were taken and a battery of ordinary cameras with the most carefully selected lenses, all packed and cased to stand the rough journey that lay ahead. It was by due attention to details and preliminary precautions that the expedition was successful. Now the public is enabled to visualize every stage of the journey.

There was no intention on the part of the expedition to obtain any record of slaughter or to search for dramatic moments or prepared tableaux. The animals were to be photographed unharrassed and undisturbed in their natural surroundings. Native life was to be free from a suggestion of Earl's Court or Coney Island. Only by such restrictions would the records be of value in the future, as much of the wild game is doomed for extinction and the native life will change with the influx of civilization. It is the intention to present a duplicate set of these films for free exhibition to every great museum of the world—a proposal that has been accepted enthusiastically by the museum authorities of Europe and America.

*All the illustrations that appear in this article are from a book that will shortly appear, entitled, "Through Central Africa from Coast to Coast", and they are copyrighted by James Barnes, 1915, with all rights reserved.



GRÉVY ZEBRA MARE AND FOAL

After reaching Nairobi in British East Africa, the starting point of the hunting safaris (caravans) that go out in large numbers every season, with a hundred and ten native porters the expedition left the Uganda road at Gil-Gil, skirting the Abadare Mountains and marching on rapidly north of Mount Kenia toward the Uashu Nero River, one of those mysterious streams that has no outlet to the sea; for, although of great volume, it flows into the Larian Swamp and disappears.

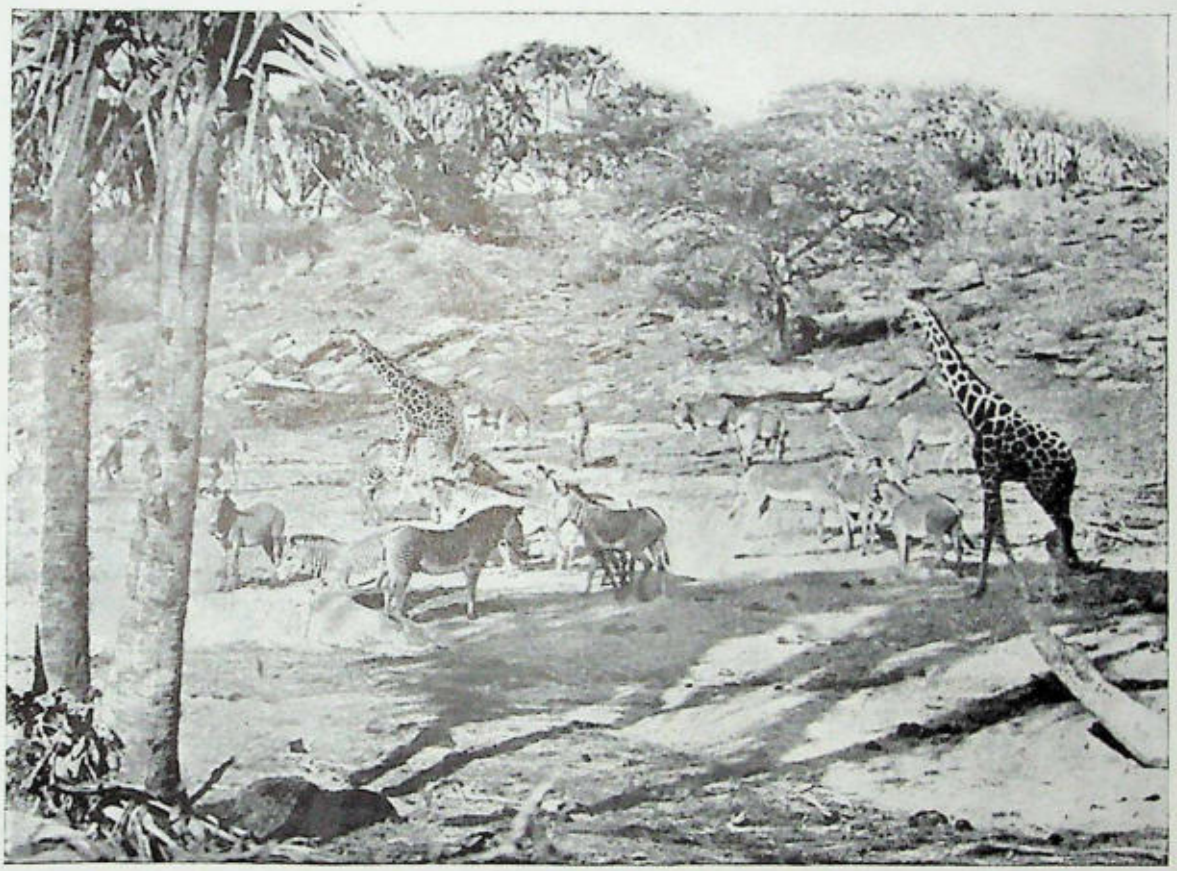
It had been the intention to secure camels in order to press on into the almost waterless country that lies up toward the Abyssinian border—the country of the Randile, Boran, and Samburra tribes that inhabit the country to the westward of Somaliland. Runners had been sent forward two weeks ahead to procure these useful beasts of burden, but it was found impossible, and the plans had to be changed and the necessary water had to be carried in canvas bags constructed for the emergency.

With lightened loads the safari made good time, averaging daily marches of over twenty-seven miles, and arriving at the first oasis or water hole on the fourth day; then going still further north until a large encampment of the Samburra tribe was reached on the edge of the great desert of thorn bush crossed by rocky ridges and volcanic escarpments.

Water indeed was scarce here. The animals of the surrounding country were forced to visit the sandy stretches of a dried river bed and there dig through the surface in order to get at the hidden springs. Here blinds or hide-ups were constructed and the animals were photographed as they came down to drink.

From the fresh spoor, or tracks, there were found to be many species frequenting the neighborhood, elephant, rhinoceros, lion, leopard, hyena, giraffe, oryx, impala, Granti and geronok gazelles, Grevy zebra, wild pig, wart hog, baboon, and monkeys of different species — and strange to relate on one occasion three unusual visitors, in a country where water is so hard to get—a buffalo, a waterbuck and a lesser kudu. There were many varieties of vulture and eagle, marabou stork, guinea fowl, sand grouse and wild pigeons. Also in the thorn bush were to be found those strange, little horned creatures not larger than rabbits, the dik-dik.

After spending some weeks in this hot coun-



GRÉVY ZEBRAS AND GIRAFFES

View from "The Little Back Room in Noah's Ark"

try—the thermometer on occasions registering in the neighborhood of 130 degrees—the members of the expedition, well satisfied with their work, started south, and skirting the foothills of Mount Kenia, spent another month or so on the well-known hunting grounds of the Athi Plains and the Thika and Tana Rivers.

In his forthcoming book "Through Central Africa From Coast to Coast" (Appleton), Mr. Barnes in referring to the journey to 'Picture Land,' as he calls it, writes as follows:

"The elephants, to our great mortification, only came down at night. We could see them in the faint light, moving sometimes within less than a hundred yards from our little back room in Noah's Ark. They screamed and trumpeted, blowing sand and water over their huge bodies, but only once did one linger long enough for us to get a good sight of him by daylight. He was a huge lone bull with small tusks, and as it was the first wild elephant that I had clearly seen I compared him with my recollection of the famous Jumbo, and Jumbo suffered by comparison. It is not always the largest elephant that carries the heaviest ivory, and I doubt if this big bull's tusks would have gone over thirty or thirty-five pounds.

"It was early dawn when we discovered him, wandering about the sandy river bed, and very cautiously, with cameras ready, we began to stalk him. I do not doubt but that we could have secured some pictures had it not been for the irritating habits of the baboons, whose different colonies in the neighborhood would have made a population of thousands. Whether they had made a compact with the elephant to play sentry for him we never could determine, but at a single bark from a watchful old female baboon who was observing us from a tree-top, he was off, ears spread out like spinnakers. Having been thus disclosed, we started after him hot foot, but as he easily went eight miles to our five, we were soon distanced and gave it up.

"He must have been a rampageous old fellow possessed of great strength and a vile temper, for he had needlessly wrecked the scenery, over-

turning huge trees, some two feet in diameter, and tossing them about all over the place. He did not belong to the escarpment herd that consisted mainly of cows with calves, and very young bulls. He was just a pestiferous old bachelor, or, perhaps, a disgruntled widower. At all events, he disdained the company of his kind, and when he was down, and the desire for drink was on him, the rest gave him a wide berth and let him have it all to himself.

"The vultures were almost always there. There were four or five varieties of them, and frequently some eagles. The baboons—in fact all the game—strolled in and out amongst them in most friendly fashion. These ugly scavengers and birds of prey were regular topers. They lounged about the water holes all day, occasionally drinking, and frequently having little rows among themselves. Right under the eye of the camera on one occasion (it is recorded on the film) a big bull oryx walked up to a group and scattered them with his horns. It was just like a policeman saying: 'Here, you loafers, move on. You've hung around here long enough!'

"When the game was coming, we in the hide-up forgot the broiling heat and the crawling things that persisted in working their way under our clothing. It was quite fascinating to watch the timid impalla approach. The ewes shy and frightened—perhaps, being females it was half pretense—being herded along by their lord and master, and he, jealous as an old Turk with his harem, making frequent rushes at the gay and unattached Lotharios who hung about the flanks of his polygamous family. The Grevy zebra would come trotting down, clattering along like detachments of cavalry. Prerogatives they insisted on; the stallions drank before the mares, and the mothers before their offspring.

"We were much amused by watching a tidy little mare teach her foal manners. The young one, a beautiful creature, insisted on putting his nose into his mother's drink, and having repeated the offence, received a good slam in the ribs by way of admonition; not a hard kick that would do any harm, but just a little lesson in family etiquette that appeared to be taken to heart.

"Sometimes as we peered out through the peep holes in our hide-ups we had the satisfaction of seeing many different animals gathered at the same time. Oryx and impalla, Grevy, wild pig, and vulture were wandering about, and slowly we were accumulating our photographic treasures that we had come so many miles to get.

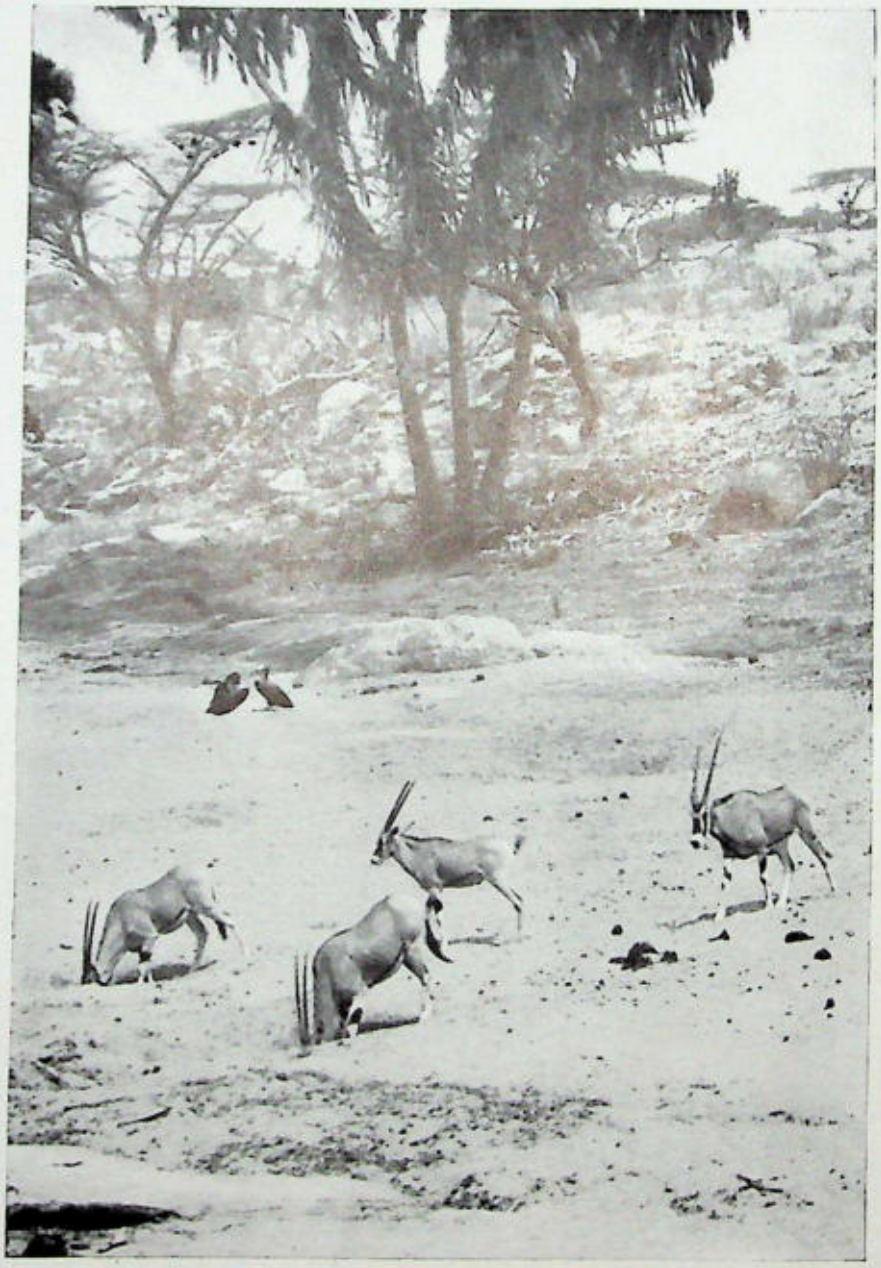
"It was the next morning but one that Kearton got a strange picture by accident. From the upper hide-up a large herd of impalla could be seen grazing down toward the water hole, and moving very slowly, when suddenly the well-known deep-toned roar of a male lion was heard a short distance away to the right. It was coming nearer, and then, most surprising sight, a full-grown, black-maned fellow came walking, or better, half trotting, along the edge of the river bank, heading toward the ramp that led down to the sandy stretch. As he came on he kept repeating those rasping half grunts, half barks, that always follow the deep-toned bellowing note. Without an intake of breath, he repeated this over twenty times, *and the impalla, not a hundred yards beyond him, did not raise their heads.* They kept on quietly feeding.

"It was a lesson in natural history; a moment of intense dramatic interest, and Kearton, although the light was not brilliant, had all the time kept turning the handle of the Newman silent camera, and we have that picture on the film. Although the beautiful black-maned male presented a fair target, not a rifle was pointed at him, and after another roar he walked sedately into the bush.

"The behaviour of the impalla was contrary to all ideas of what animals would do under the circumstances, and the obvious lesson was this: Those timid gazelles knew one of three things, or perhaps knew all of them. The fact that the lion was roaring may have been a sign of truce; maybe it was proof to them that he had already made his kill and had fed, and was exulting over his perfect digestion; they may have recognized the fact that he was not hunting, and bore them personally no ill-will, or that seeing him in broad daylight, trusted to their swiftness of foot, that they could escape at any time if he made a move in their direction."

Further on in retrospective mood, Mr. Barnes has written something that brings back the atmosphere as it affected him and as it has affected others—the Call of Africa:—

"Many times when feeling the oppression and depression of brick-and-mortar walls, the gloom of the narrow streets and the deafening roar of traffic, I have longed for the open spaces. I call back to my mind's eye just one spot to which, were I Aladdin, I would go this instant; it is to the Valley of the Twin Peaks up towards the Uashu Neru. The grass is green from the recent rains; it slopes gently down to the river bank; thorn trees, whose branches stretch out so evenly that from a distance they look like great green mushrooms, rise to the right; along the river bank flourish the great Don palms, and at the end of the valley one sees the peaks,



ORYX AND VULTURES AT THE WATER HOLES

so exactly alike in their contour that it appears that they were made from the same mould. They look to be only some six or eight miles off, but they are nearer forty, so clear is the air.

"Quite near stands a female giraffe with her little one. He is frolicking about, kicking his long, ungainly legs like a colt in the pasture. A troop of oryx is coming down the valley headed for the water; with their long horns gleaming in the sunlight. They look like a squadron of cavalry with drawn sabres. A herd of zebra stands about under the thorn trees, and by himself, firm on his short, stumpy legs, is an old rhino fast asleep. He has not moved for an hour. The tick birds running up and down his sides do not seem to disturb him in the least.

"Walk down into the valley. The animals will not run from you. For a wager, if you



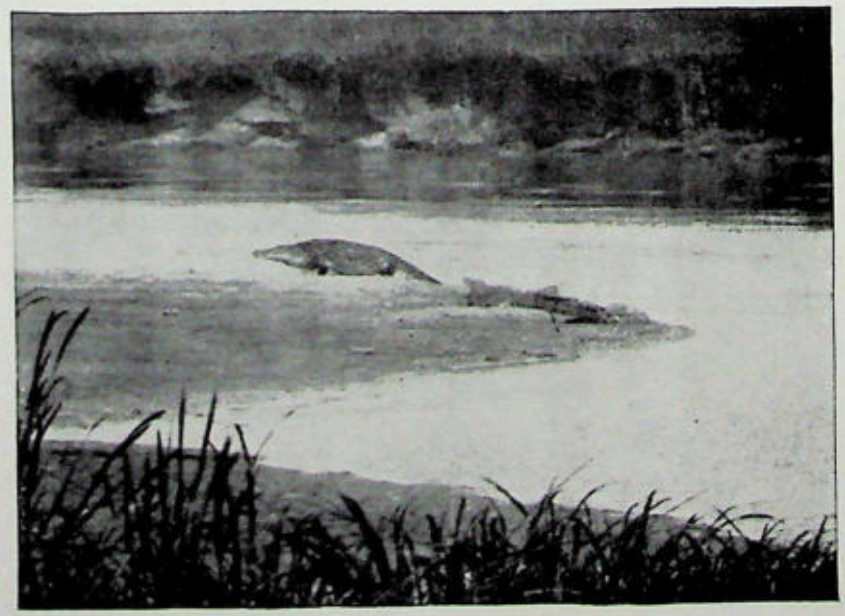
A HERD OF ORYX WITH SOME RECORD HEADS

studied the wind and used great caution, you could go up to that sleeping survivor of things that lived before the Flood and slap him with your hat. I wouldn't advise you to try to hang it on the top of his ugly-looking horn; in fact, I wouldn't advise you even to slap him—but you could. I'd like to see this place and this sight again. I'd like to have once more the experience that I had one morning down near the Tana River.

"There was a herd of kongoni, a few wildebeeste and zebra among them and some little Thomson gazelles feeding about half a mile away. I tried an experiment. Where game has not been shot at they seem by some peculiar divination to know whether your errand is a bloodthirsty or a peaceful one. If you walk steadily on, paying no attention to them, they will lift their heads, look at you, and go on with their feeding. Stop an instant and they become suspicious.

"I walked towards that herd of mixed game, slantingly so to speak, never facing them directly, never turning my head, only watching them sideways. I do not know whether any hunter or sportsman had this experience before, but I actually got amongst them; suiting my pace to theirs. I drifted along with some of the animals not more than thirty or forty yards away — not one started to run. I longed for a camera, but I am afraid that if I had made any unnatural movements they would have been off.

"Two or three days after, in just the same country, it was necessary to shoot to get some meat for the camp. I could not get within two hundred and fifty yards of anything that possessed horns or hoofs; they seemed to know my intention. Most of the gazelles and antelopes are capable of being tamed or domesticated. The eland, the largest of the antelope, has been broken to harness. I was told that there was a



A GOLIATH AMONG "CROCS."

white settler who had two that would draw a light plough.

"Near the hill of Donaysapuk, at the edge of the Athi Plains, there is a small herd of roan antelope that has been thoroughly protected, and although there has been much shooting in the neighborhood — and they are naturally among the most timid of animals—they seem to know that they are exempt, for, apparently, they have little fear of man. I have never heard of any attempt in Africa to domesticate the buffalo, but I remember at Kampala there was a young cow buffalo that had joined a herd of cattle and went into the kraal with them at night. That nothing practical can be made of the zebra is most strange; they are immune from the fly and from many diseases that inflict both mules and horses, and although they scamper and run in the roughest and most stony places, seldom is one found whose hoofs are not in the finest condition. They have been trained both to harness and saddle, but they break down very easily and have no spirit, so, at least, I was told by a man who made the experiment.

"The time when I longed for a camera was paralleled by one case where I did not have my rifle; my gunbearer was with me with only a shot gun. There were some guinea-fowl in the bushes near camp and I was gunning for the evening meal. We had not gone far; in fact, we were close enough to hear the voices of the boys who were bringing in firewood. Suddenly I looked up astonished; there about sixty yards off stood that most desired of all trophies—a fine male kudu, the tips of his spiral horns shining like ivory. From force of habit John, the gunbearer, thrust the shotgun into my hands. He might as well have given me a pea-shooter. That magnificent head fascinated me. I could not take my eyes off it. For fully twenty seconds that kudu and I stood looking at each other, then with a snort and a bound he was off, and I never saw him nor his like again. It was one of the chance encounters in which 'the land of footprints' abounds.

"And now a bit of advice—go to British East Africa. Take a good camera with you and learn how to use it. It is more productive of pleasure in after years than anything else. With regard to cameras, they, too, like rifles, are a great deal a matter of taste. A good lens is, of course, a *sine qua non*. If moving pictures are the objective, one thing is necessary, take plenty of film, for it is impossible to get it out there.

"In picking a gunbearer get one who has gone out with a real sportsman and not the average armed tourist. Impress upon him exactly what you want him to do and have done, and keep him up to the mark. Don't fail to get a good *fundi* or skinner; many trophies are lost through careless work. So far as the safari goes, try to get interested in your men and get them interested in you. Things will work twice as easily. In choosing a headman, find somebody with whom he has served, if it is possible, and discuss his points. In taking a white hunter, if you have to take one, ask all the questions about him that you can, and see as much as you can of him yourself before you start. No matter what happens, keep your temper in Africa. Somebody has spoken of the country as 'the grave of reputations'; there is not the least doubt of it. Many have failed here who have succeeded elsewhere. But it is a mausoleum of sweet dispositions.

"In all this I am speaking of the high plateaus, of the country of grass and hill and sunshine, and of this I have only one more thing to say: Go there if you get the chance; you'll never regret it. From the country of the sickness, of the fly, of the dirt and disease, of the dank solitudes, choking downpours and starvation, keep away. As the Scribe remarked in the preface, and the photographer will back him up, 'We are very glad we went, but there are certain portions of the journey that we would not care to do again.

"And referring to that 'call' again, the author writes: Only the other day I felt the call! I would have given something for the sight of the wide stretch of the grey-green plains dotted with thorn trees, the warmth of the spreading sunshine, and the gleaming pinnacle of Kenia rising above the belt of white clouds! Then, again, I thought of the gloom of the forest, of the cold, damp mornings, and of the prospect of the long trudge through the muddy ooze; of the many painful sights and the sickening villages; and I was glad to be back safe with it all behind me. Experience is something that one can only buy with experience!"

RECEPTIONS.

The annual Aquarium reception to the members of the Society will be held Monday, May 3, 1915, at 8:30 o'clock P. M., in the Aquarium Building, Battery Park.

At the Zoological Park, the Ladies' Auxiliary will hold their annual garden party on Thursday, May 13, 1915, at 3 o'clock P. M., and on Thursday, June 3, 1915, at 3 o'clock P. M., there will be a reception for the members of the Society.

ZOOLOGICAL SOCIETY BULLETIN

Departments:

Mammals
W. T. Hornaday.

Birds
C. William Beebe.
Lee S. Crandall.

Aquarium
C. H. Townsend.
Raymond C. Osburn.

Reptiles
Raymond L. Ditmars.

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Elwin R. Sanborn,
Editor and Official Photographer

Vol. XVIII, No. 3. MAY, 1915

MR. JAMES BARNES.

It is a genuine pleasure to place before the readers of the Bulletin an illustrated article, partly in the words of the explorer himself, fairly conveying an index impression of a wonderfully enterprising and successful camera expedition to the newest and best big-game region of eastern Africa. The members of the Zoological Society who saw Mr. Barnes' motion pictures at the annual meeting, fully recognize their high zoological value and their rarity.

The illustrations that accompany our story of the Barnes-Kearton expedition have been kindly loaned for reproduction here from Mr. Barnes' forthcoming book, which will be entitled: "Through Central Africa from Coast to Coast," and will be published by D. Appleton & Co.

MISS LILLIAN BELLE SAGE.

On April 6, after an illness of three months, Miss Lillian Belle Sage, head of the Biology Department of the Washington Irving High School for Girls, New York City, passed from this life. Her untimely death caused deep regret to the officers of the Zoological Park staff, all of whom had come in touch with her through her work.

To Miss Sage belongs the honor of having conceived and wrought out to a triumphant conclusion the first vivarium ever installed in an American institution of learning. While it is true, in the working out of details, she had the co-operation of several officers of the Zoological Park, the idea, and its execution were all distinctly hers. She it was who secured the inclusion in the plans for the construction of the Washington Irving School Building, the plans of the vivarium and specifications, and then secured a maintenance arrangement. Finally, through her lectures and demonstrations, she made the vivarium and its living creatures accessible to the thousands of New York school children whose schools were within reach of the Washington Irving High School.

Never, we venture to say, was a zoological teaching experiment more signally successful, or more popular; and it is a satisfaction to remember that Miss Sage lived to witness the triumph of her idea. There is also some satisfaction in the thought that the Zoological Park did its duty in the matter.

It is safe to predict that this vivarium will set a fashion and become a model for similar equipments in other American schools; and we sincerely hope that a tablet in Miss Sage's memory, commemorating her initiative and her success, will be erected in the Washington Irving High School to a good teacher of charming personality.

W. T. H.

ROSA BONHEUR'S "PORTRAIT OF A LIONESS."

After all has been said that can be said, Rosa Bonheur and Edwin Landseer were the first real masters of wild animal portraiture. The inspiration of their work goes on forever. The art critics of to-day may call their work old-fashioned and out of date, but to the world at large it is immortal.

Fortunate indeed is the American art gallery, public or private, that can show even one painting by Rosa Bonheur. As a great surprise, Mrs. Frederic Ferris Thompson has recently placed the Zoological Society's collection of wild animal painting in that privileged class, by the gift of the superb "Portrait of a Lioness" that is reproduced as the frontispiece of this Bulletin. In size the canvas is 31 x 37 inches, and the portrait, like nearly all "life-size" portraits of men, is a little larger than life.

No one who views this painting as it hangs temporarily in the great reception room of the Administration Building, needs to be told that it is a masterpiece. The drawing, the hair treatment, and the serene and dignified facial expression are fairly beyond the reach of criticism.

The Zoological Society is fortunate in securing such a work of art at this time, while the gallery of paintings is still in its first stage of formation.

Mrs. Thompson is a founder of the Society, and also of the Permanent Wild Life Protection Fund, and her extensive aviaries at "Sonneberg," Canandaigua, were described and illustrated in the BULLETIN by Mr. Lee S. Crandall in the issue for September, 1911.

NATURAL ENEMIES OF INTRODUCED BIRDS

By G. INNESS HARTLEY.

During the winter of 1911-1912, Mr. J. B. Thomas of New York and myself decided to introduce the Hungarian partridge, with the idea of stocking the neighborhood with game for future shooting. The country—twenty-five miles south of Harper's Ferry, Virginia—is very open and hilly, well watered and divided into large, clear fields averaging some forty acres in extent, with very little natural cover for birds. We selected a spot sheltered by a stone wall on the bank of a small stream where a covey of bob-whites was wintering in a tangle of cat briars.

The first shipment of partridges arrived February 24, 1912. They were all strong, wild birds recently imported from their native heath.

For the first few days of freedom the birds did well, intermingling with the bob-whites and roosting in the stone wall and under a shelter of fodder prepared for them. During the first week in March three were killed by a Cooper hawk (*Accipiter cooperi*) which was finally secured. About the 10th of March very severe weather set in and several inches of snow fell. A thick crust was formed due to a brief rainy spell, making the partridge and bob-white very conspicuous objects against the white snow.

In less than a week all but three of the twenty-one remaining partridges were taken by hawks and vermin, some dying so far as was observed from the severity of the elements. Of the bob-whites but four remained out of nine. The three remaining partridges took cover in the stone wall, forsaking other cover, and came successfully through this trying season.

About April 15, we liberated twenty-four more Hungarian partridges, choosing another site but with practically the same setting. During the first six hours of liberation three partridges were taken—two by *Accipiter cooperi* and one by a red-tailed hawk (*Buteo borealis*). By the close of the first week there were eleven partridges remaining of the second group. The red-tailed hawk was their worst enemy.

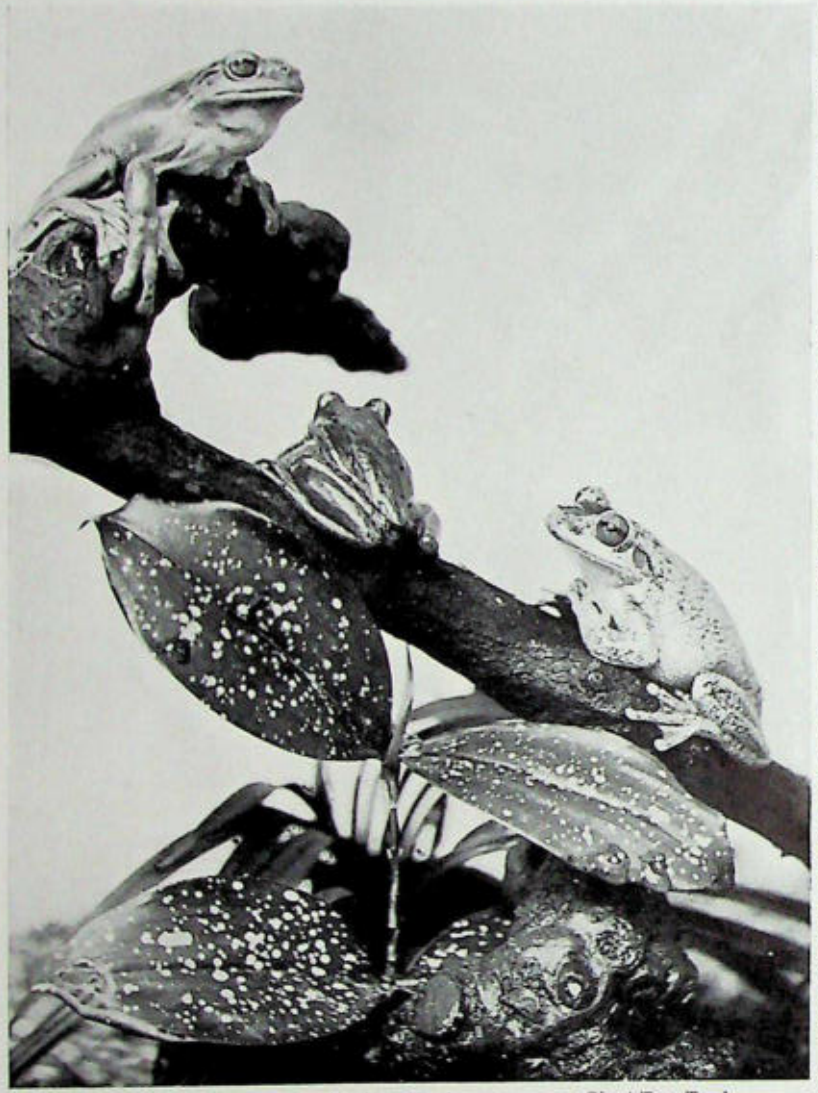
In the course of the spring, remains of these partridges were found in the nests of eight red-tailed hawks and in one great horned owl's nest. Besides one or two crows, I had never seen these hawks take any wild bird before. But they, having their young to provide for, naturally took the easiest prey offered and certainly these partridges, for the first few days at least, unaccustomed to the new conditions as they were, offered a most alluring mark. Since that time I have never observed a red-tailed hawk take one of these birds.

During the summer of 1912 four broods were raised, three of which were under my daily observation. These contained nine, thirteen and seven birds respectively. They lived in the most open fields. In the fall they took to the wheat stubble where they remained throughout the winter. When frightened they would either run swiftly to small tussocks of weeds, scarcely large enough to cover them, or fly to other open fields, never seeking dense cover or underbrush.

During the winter of 1912-'13 the hawks were very plentiful — especially Cooper. Of one covey of fourteen bob-whites only four remained in April. These wintered in an intensely thick tangle of cat-briars and black berries. Of the twenty-nine partridges observed in the fall only seven were lost, four of these being taken in March when snow covered the ground for two weeks and the hawks and owls were particularly numerous. These partridges have now secured a firm foot-hold in the country and are increasing rapidly.

To summarize, it would seem that in one generation the Hungarian partridge was able to adapt itself to entirely new conditions. In open fields it was able to hold its own against its natural enemies as well as, if not better than the native bob-white living in its thickets and tangles of briars.

Grevy Zebra.—Even during the winter, on mild, bright days the various zebras are permitted to run into their yards for exercise. Our fine, male example of the Grevy zebra, however, appeared to scent spring in the air a few days ago and commenced a series of remarkable capers in the shape of galloping about, pawing up the ground of his corral and making dashes at the fence, terminating such performances with an abrupt slide. During the winter his hoofs grew very soft; in fact, so tender that his spring gambols resulted in his feet becoming very sore and he was necessarily confined to a deeply bedded stall. In consequence there is much noise from this animal as he looks through the glass panels of his door and vigorously brays at his more unrestrained associates who exercise outside.



White Tree Toad Golden Tree Toad Giant Tree Toad



White Tree Toad (upper) Natterjack Toad (middle) Marine Toad (bottom)

SOME RARE TERRESTRIAL AND ARBOREAL TOADS

From the collections of the Zoological Park.



A TOAD FROM SOUTH AMERICA. *BUFO MOLITOR*

SOME RARE AMPHIBIANS.

By RAYMOND L. DITMARS.

FOR years past the Reptile House has been noted as a building of silent inmates. Days might pass when the only sounds were the splashing of the alligators or an occasional bull-like bellow from these great reptiles. The Reptile House has changed its aspect in now sheltering quite a number of more cheerful voiced inmates. These are the toads and frogs, and to this collection we lately have added a number of rare and particularly interesting species. The greater number of these have never been exhibited alive in the United States. The noisy members of this collection are mostly tree toads, and each species has a characteristic and markedly different note.

For about three years we have been steadily building up a series of amphibians until the Reptile House has now one of the best collections on exhibition in the world. Our visitors are always especially interested in investigating the contents of many small, attractively labelled cages, and it is under such conditions only that the small amphibians necessarily can be maintained. Keeper Richard Deckert has devoted much time and study to these neglected but fascinating creatures, and has for some time been working on a carefully studied article for *Zoologica* which will embrace observations on our more important specimens.

At the present time there are thirty-seven cages of amphibians—frogs, toads, salamanders and newts—on exhibition in the Park, and about seventy species of the amphibians are represented. An interesting list of the species on exhibition at the close of the year 1914 appeared in the *Nineteenth Annual Report* on pages 85, 86 and 87.

New to our collection is the huge White Tree Toad, of Australia, which attains a body length of five inches. The species is particularly interesting on account of its peculiar call which resembles the barking of a small dog, and is repeated twenty times or more. The creature is of a vivid and uniform leaf green with enormously dilated disks or suckers upon fingers and toes. It consequently has unusual clinging power, and the keepers in changing these toads from one cage to another must use great care not to injure the delicate animals in loosening their hold. Contrary to the habits of tree toads generally, this one is a very confiding creature and, when once freed from a branch to which it has been clinging, appears to have no objection to being handled and will contentedly settle down



WHITE TREE TOAD

on the keeper's hand, tucking its huge feet beneath its body in an attitude of perfect contentment.

Occupying the same cage with the big green tree toads is another species from Australia of remarkably brilliant coloration — one of the most attractive of its race. This is the beautiful Golden Tree Toad. It is a large species of over three inches in length of body, of a bright metallic green broadly barred or blotched with a hue as vivid as bronze paint. When chilled, the entire color pattern may fade to a dull, blotchy-brown. In form this species is much like the typical frogs of the genus *Rana*. We have never heard the voice of this handsome species, but its silence is quite counterbalanced by the specimens of the Perron Tree Toad in an adjoining cage. This is another Australian species and emits a startling call that much resembles the sound made by a pneumatic riveting machine. When the animal sings the throat pouch is expanded into a large and transluscent globe larger than the toad's head, while the body vibrates with the effort of the call. Other noteworthy tree toads in the collection are the Baudin Tree Toad, collected in Costa Rica by Assistant Curator Crandall, and the Giant Tree Toad of the West Indies and Bahamas. The latter specimen was collected by Curator Engelhardt, of the Brooklyn Institute of Arts and Sciences. The West Indian species is the largest of the New World tree toads. It is not only cannibalistic, but will eat small birds, mice and even small snakes.

Aside from the noteworthy series of frogs and toads, we have now on exhibition a very interesting collection of the tailed amphibians, the salamanders and their allies. We have maintained specimens of the Blind Proteus, a strictly aquatic salamander, for a period of about two years. These curious creatures come from the subterranean rivers of the Adelsberg Cave, in Austria. The eyes are indicated by mere depressions with a sunken dot of color, although in the larval form the eye is at first well developed. If kept in a strong light these sensitive creatures do not fare well. We paint three sides of their tank with opaque black, leaving the front panel clear for observation. After a few months' time the light through the single panel markedly affects these animals' skin. At first they are of a pale cream color, but they gradually change to a dull, slaty hue. Their food consists of very small earthworms. In motion the diminutive limbs are little used, the creature propelling its elongate body with eel-like motions.

Several specimens of a remarkable land salamander recently arrived from the west represent a species known technically as *Batrachoseps caudatus*. This is popularly known as the Worm Salamander and is probably the most excessively elongate form among any of the terrestrial salamanders. Our examples are from four to five inches long with limbs so minute and delicate that the animal's progress is of almost snail-like pace. This curious salamander has a most northerly distribution, being found from California into Alaska.

Keeper Deckert last fall added specimens of an interesting salamander to the collection. This is the Jefferson Salamander, *Amblystoma jeffersonianum*, a very slender form of *Amblystoma* and rarely obtained from the eastern coastal region. Its habitat is the Allegheny region but Mr. Deckert collected four specimens near White Plains, Westchester County, New York.



GOLDEN TREE TOAD



STANLEY II SHEDDING HIS ANTLERS

Although it happens every year, he is as much mystified as those who watch them grow. The antlers are lying exactly as they dropped.

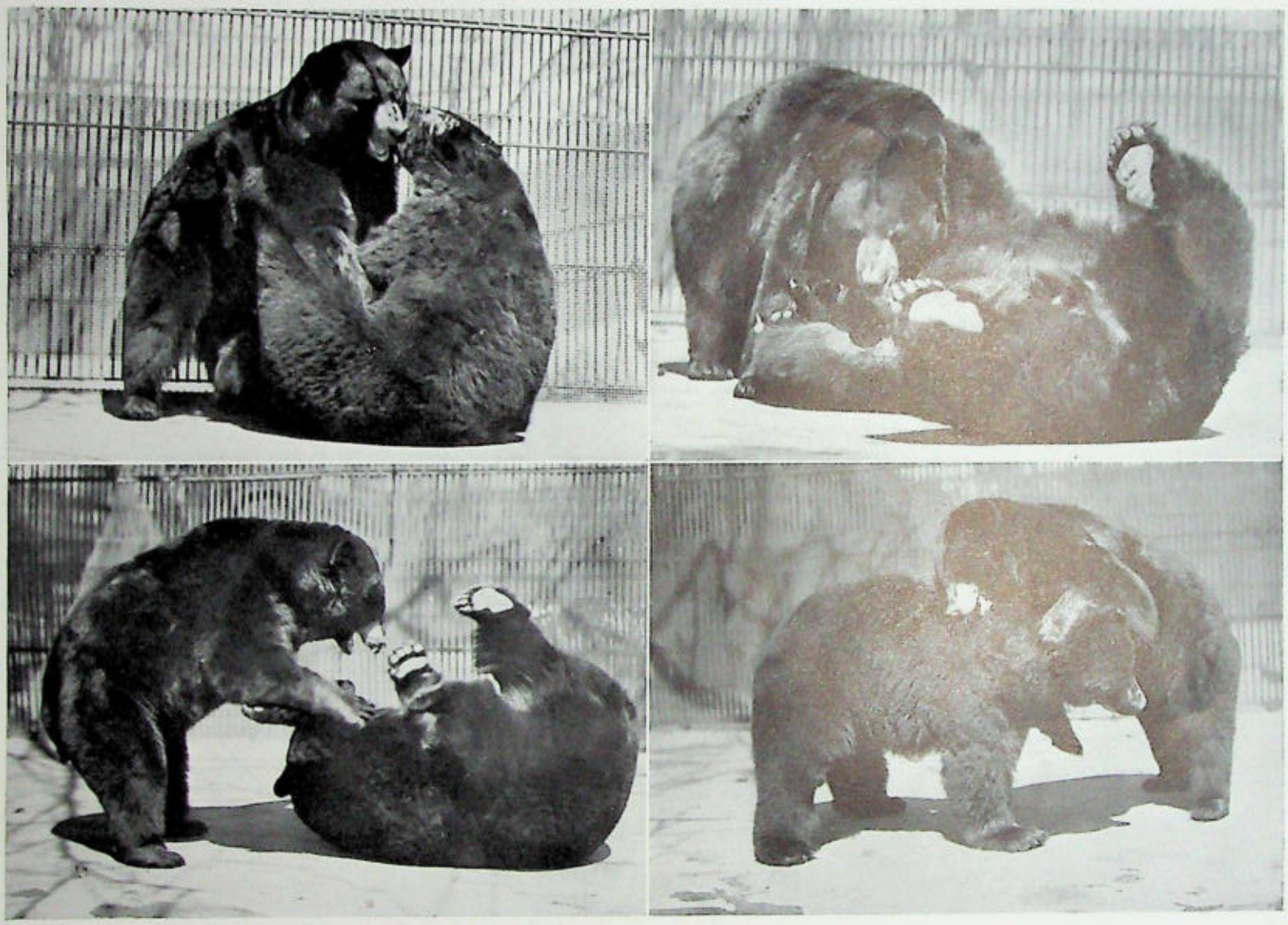
All forms of the axolotl are now shown in our collection, both black and albino of the water form, and the western and eastern forms of the terrestrial type. The boldly marbled form from Long Island is of especial interest. Our western specimens came from Arizona and show but slight traces of pattern.

ITEMS OF INTEREST.

Tardy Spring.—Indications point to another tardy spring as the month of March ushered in the usual winds, but tempered with severe cold. It is rather unusual to record temperatures below 20° during the latter part of March and a snowfall of nine inches early in April, but this has been the case, with the addition of at least three cold waves. There have already been hints of spring and we have heard tree toads singing in the marshes and have noted that frog eggs have been laid in several ponds of the Park. The storm doors have been removed from the several buildings where hoofed stock is quartered and the animals are anxious to go out. We are waiting for the first balmy days when there will be great joy among the various animals first turned out for exercise.

Batrachians.—Our series of batrachians has increased to such imposing proportions that in the present number of the BULLETIN we are issuing an outline of some of the more noteworthy specimens of the collection and an early number of *Zoologica* will contain a more formal paper with a number of color plates relating to rare and little-known specimens, exhibited in the Park. During the past year we have added species to our collection for the first time exhibited alive in the United States.

Woolly Monkeys.—After breaking all records in keeping representatives of the species in captivity, at last we are obliged to record the loss of all of our woolly monkeys. One specimen lived in the annex of the Reptile House for a period of over four years and another for a period of two years' time. We attributed the loss of the oldest specimens to two examples that arrived here about eight months ago. Although apparently healthy and for several



BLACK BEARS ENGAGED IN A FRIENDLY TUSSLE

The Society's collection of bears is healthy, lively and generally peaceful.

months appearing to be in thriving condition, we blame them for importing a disease that killed the entire group. All the specimens of this much lamented collection died within ten days' time.

An Interesting Patient.—It is with much satisfaction that we note the steady and marked improvement of the gorilla Dinah. Early in the winter Dinah was afflicted with paralysis of all her limbs and we had little hopes of her recovery. She apparently passed through a severe crisis and has returned to health and strength. She is able to walk without difficulty and the use of her arms is nearly normal. Since the time of her illness she has gained three pounds in weight and is much improved in disposition. Dinah is under a strict application of the fresh air treatment and during the cold days this winter was bundled in blankets by her keeper and wheeled about the Park in her carriage for at least two hours.

Our Gibbons.—It appears that we are to break more records with our gibbons in captivity. Our two specimens continue to thrive and it is of interest to note that one of these is of a species with a very bad reputation as regards health in captivity—the hoolock gibbon.

Cage Backgrounds.—After the winter months the work of renovating some of the buildings was taken in hand and the painting of new backgrounds was recently finished by Mr. E. A. Costain, in the cage of the larger constricting snakes at the extreme westerly end of the Reptile House. From a series of photographs Mr. Costain has rendered a very beautiful effect of jungle vegetation in South America. The palms, tangled vines and branches bearing parasitic plants with brilliant flowers, impart a very interesting effect. It is from the country shown in this background that we shall receive a number of reptiles the coming summer as we anticipate that the war conditions will give us much trouble in obtaining Old World reptiles.

R. L. D.

A Wandering Merganser.—Many birds captured under unusual circumstances, have come to the Zoological Park. They have flown into windows or telegraph wires, or have been picked up at sea. But one of the most interesting cases which has come to the notice of the writer, is that of an American merganser. This bird is an unusually fine specimen, in the handsome black and white plumage of the adult male, and is entirely without injury.

As a watchman was making his weekly rounds through the empty tube of the Catskill Aqueduct, near the shaft at 165th Street and Edgecomb Avenue, he noticed a flapping object in the tunnel ahead of him. Not without some misgivings, he approached, and the light from his lantern disclosed a much bedraggled bird. It was captured with a little trouble, and the watchman, William Carey, thoughtfully telephoned to the Zoological Park, asking us to send for a strange duck.

Our pleasure at receiving the gift was not entirely unreserved, as mergansers are very difficult subjects during the first days of captivity. However, after much careful nursing by Keeper Atkin, the bird was brought safely through the first stages and is now enjoying life in the northern paddock of the Goose Aviary. It is the first of his kind we have ever exhibited and we shall never have a finer.

The most remarkable part of the affair lies in the fact that, except for a few shafts, the Aqueduct tube, which is not yet in use, is entirely closed. According to the watchman, the opening at 165th Street, which is 500 feet deep, and one near Yonkers, with a drop of 250 feet, are the only ones not covered over. As access could not be gained in any other way, it seems certain that the bird must in some way have dropped down one of the perpendicular shafts, the least of which is 250 feet!

Experimental Feeding.—Of late years, many advances have been made in the treatment of ailing animals. Serums and antitoxins have been obtained to combat specific diseases, while modern methods of care and treatment have greatly reduced the number of cases. Still, the eccentricities of wild animals in captivity offer many obstacles not met with in domestic breeds, and often make even a correct diagnosis difficult. The first indication of illness is often a refusal of food, and an animal that will take no nourishment is doomed. Birds are among the most provoking in this respect, and among them all, in spite of its great size and apparent hardiness, the ostrich is perhaps the most puzzling. With the slightest physical derangement, an ostrich "goes off its feed," and if heroic measures are not adopted, soon becomes so emaciated as to become a prey to some really dangerous ailment.

On December 23, 1914, a fine male South African ostrich, received during the summer from one of the great Arizona farms, refused his morning meal. He showed no symptoms whatever, and appeared to be in perfect condition. A week passed, and the bird began to show the effects of his abstinence. At this point, Keeper George Snyder came to the rescue. At



HOUSECLEANING TIME IN THE BEAR DENS

Ivan, the big Peninsula Bear has been coaxed to the rocks at the back of his enclosure while the keepers are washing the floor of his cage.



MALE SOUTH AFRICAN OSTRICH AND HIS MATE

The male specimen was forcibly fed by hand for six weeks, during a period of inactivity.

considerable personal risk, he commenced a system of forcible feeding, shoving bolus after bolus of food wrapped in lettuce leaves down the unwilling throat of the bird. For over six weeks this curious treatment continued, the ostrich finally becoming so accustomed to handling that he ceased to resist. On February 6, 1915, he first evinced a willingness to feed for himself, and soon was taking his normal ration.

Throughout the entire period, the bird was kept in an unheated enclosure, and forced to take active daily exercise in an outdoor run. We were unable to detect the slightest further symptoms of internal trouble, but there is no doubt that the ostrich owes his present excellent health to the perseverance of his keeper.

L. S. C.

NEW MEMBERS

January 1, 1915-May 1, 1915.

LIFE MEMBERS.

Nye, Joseph Keith,
Vail, Theo. N.,
Van Rensselaer, Chas. A.,
Waid, D. Everett.

CORRESPONDING MEMBER.

E. W. Gudger.

ANNUAL MEMBERS.

Andrews, Gwynne M.,
Archbold, John F.,
Astor, Vincent,
Atwater, Richard M., Jr.,
Barney, Edgar S.,
Bauer, Oswald A.,
Bell, Ernest I.,
Bowen, Mrs. H. S.,
Brick, Samuel R.,
Crawford, Robert I.,
de Zaldo Frederick,
Durkee, Richard P. H.,
Eno, Miss Mary Pinchot,
Francke, Luis J.,
Gardiner, Charles B.,
Garrett, Miss Laura B.,
Gerry, Robert L.,
Gillies, Edwin J.,
Greer, Mrs. Louis Morris,
Grundner, M.,
Hammond, William F.,
Horr, L. Wm.,
Huntington, Ford,
Jarmulowsky, Dr. Harry,
Jenkins, Matthew C.,
Kuhn, August,
Lamborn, A. H.,
Morse, Mrs. George,
Norman, Miss Mabel,
Ottinger, Marx
Perkins, Mrs. Edward
Sargent, George Lloyd,
Schreiter, Henry,
Shepard, Finley J.,
Shonnard, Horatio S.,
Slocum, H. J., Jr.,
Stillman, Chauncey,
Swanson, Dr. F. J.,
Tanenbaum, Moses,
Taussig, Noah W.,
Taylor, Wm. A.,
Terry, Roderick, Jr.,
Terry, Wyllys,
Thompson, Ffarrington M.,
Thompson, William Boyce,
Thorne, Chas. Stockton,
Thurber, Howard F.,
Tierney, Myles J.,
Tilt, Albert,
Troescher, A. F.,
Tucker, Carll,
Vernay, Arthur S.,
Vuilleumier, Dr. Jules A.,
Wainwright, Mrs. J. Howard,
Waldo, R.,
Walker, Gustavus A.,
Watson, Thomas J.,
Watt, Thomas L.,
West, Dr. William,
Woolley, C. M.,
Woodward, Kenneth N.,
Woodward, Mrs. Wm.



AN INTERESTING CONVALESCENT

During the cold winter months, Dinah, our young gorilla, was wheeled in the open air for several hours each day by Keeper Engeholm. She improved rapidly, and has recovered from her disability.



ZOOLOGICAL SOCIETY BULLETIN

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ELAND COW AND HER CALF BORN IN THE PARK

It might be an African veldt, so few are the traces of civilization.

ZOOLOGICAL SOCIETY BULLETIN

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ZOOLOGICAL NOTES FROM PARÁ, BRAZIL

By C. WILLIAM BEEBE,

Curator of Birds.

ILLUSTRATIONS BY THE AUTHOR.

AN expedition under the auspices of the Zoological Society, to Pará, Brazil, occupied exactly seven weeks, from April 10 to May 28, 1915. In company with Mr. Inness Hartley and Keeper Atkin the writer sailed and returned on the *Stephen* of the Booth line. The chief object was the shipping and transportation of a collection of rare mammals, birds and reptiles from the Pará Zoological Gardens. This was successfully accomplished.

These Zoological Gardens are one of the chief attractions of Pará. They are small but very beautiful, and the collections are well kept and housed. Very wisely, no attempt is made to exhibit any but members of the Amazonian fauna, the sole exceptions at the time of my visit being an Indian peacock and a fully adult chimpanzee. The Museu Goeldi is in the center of the Gardens, and Dr. Snethlage holds capable sway over both institutions.

The installations are in the form of small open cages, with a *volière* of moderate size for water birds. The creatures thrive in this hot, humid climate, and in some cases live for so many years that individuals become well known to the visiting Paránese. These exhibits are scattered about the grounds, wholly submerged in a magnificent setting of the most luxuriant tropical foliage; great clumps of bamboo, swaying palms and less tropical looking rubber and fig trees, while on the ponds are lilies, and floating Victoria Regia. All these dwarf the living exhibits, and form a botanical background which makes our northern vegetation sink into insignificance.

One of the earliest printed reports on the *Jardim Zoologico* in the *Bulletin* of the Pará Museum is that of May, 1895, when there were exhibited forty-three individuals of twenty-seven species. The last census published in 1910, enumerates seven hundred individuals and two hundred and thirty species. At present the numbers are far below this.

A small flying cage is filled with water birds, and the freedom with which they breed is amazing. Snowy egrets, little blue, night and boat-billed herons, wood ibis and scarlet ibis have all nested in this enclosure. At the time of our visit yellow-crowned night herons were sitting on their eggs actually within arm's-reach of visitors. Peccaries, agoutis, several opossums and monkeys have also reared young in the Gardens. But, as in the case of most zoological gardens in the world, no details of these interesting occurrences have been kept, and we can cite only the bare facts.

In the present serious financial depression, the government of the State of Pará is finding it difficult to maintain the Museum and Gardens, and the purchase of the collection which has been acquired by our Society has proved a real boon and insures the support of the two Brazilian institutions at least for some time. Arrangements have been made for additional small shipments to be sent north every six weeks.

Aside from its situation on the equator and at the mouth of the Amazon, Pará has an historical interest to the naturalist, as being the the first place of residence of Wallace and Bates. I was interested in seeing what changes



MUSEU GOELDI, PARÁ
Principal edifice.

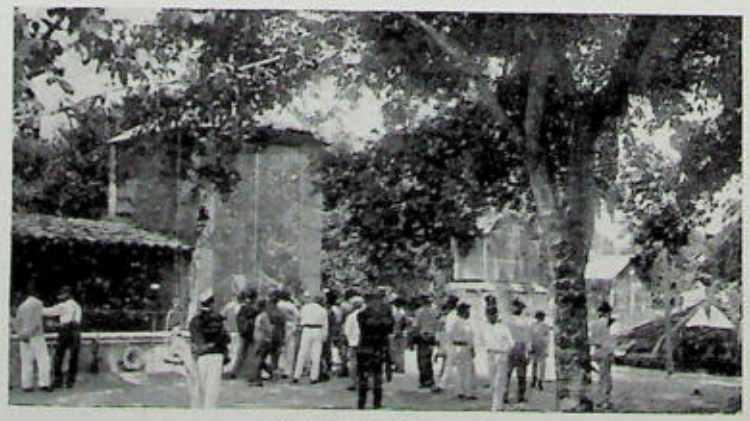
had taken place since they landed sixty-seven years before. From a population of fifteen thousand in 1848, the city has grown to two hundred thousand, and yet if one walks a little distance inland or takes the tram to the end of the line, Bates' classic description in his "Naturalist on the River Amazons" still holds good. At Nazareth where Bates first settled down to work, he was surrounded on three sides by primitive jungle. The Church of Nazareth still stands and, as in his day, is still filled with hundreds of evidences of the absolute faith of the natives—waxen effigies of terrible ravages of disease. The jungle has vanished, however, and in its place are the spacious car-barns of the electric tramway. Beyond, one may ride or motor for a mile along the Avenida Nazareth lined with balconied residences and shaded with an unbroken line of mango trees. Another mile and open country is reached and almost immediately, light jungle. Fifteen minutes' walk from the tramway brings one within shade of the Amazon jungle, where the birds and monkeys and serpents and beautiful morpho butterflies are abundant, and exactly as they were over sixty years ago when Bates and Wallace walked here; or three centuries ago when white men first founded this city; so persistent a battle does the tropical jungle wage, and so little has man won from its grasp.

Through the courtesy of Mr. Walter Binns we were able to traverse Bates' collecting grounds along the River Una which he describes so vividly in the second chapter of the "Naturalist on the River Amazons." We found the tile factory still in operation, and as our canoe crept silently up the sinuous little stream, the vegetation seemed as dense as I have seen it in the heart of Guiana or Venezuela.

While, considering its position, Pará may be ranked as a fairly healthful city, even now one may not live with impunity in the surrounding swamps. A malignant malaria had been working havoc among the natives, and it laid its hand on two of our party after a week's sojourn.

Of Pará, commercially and politically, it is not within my province to speak, but to the naturalist this city offers as rich a field today as at any time during its history.

Besides the admirable collecting and taxonomic study of Dr. Snethlage, one worker in Pará is doing splendid original research. This is the Rev. A. Miles Moss, who, being one of the busiest of men, finds time to hunt caterpillars. Little by little he is elucidating the complete life histories of the butterflies and moths of Pará, breeding and painting them, and thus carrying on in this field the kind of work which must soon come to be the most important branch of zoological and evolutionary research.



MUSEU GOELDI, PARÁ
Some of the installations.

Sixty-two specimens of forty-three species of Brazilian birds were brought north to our Zoological Park. Fifteen species of these are quite new to the collection, while there can hardly be said to be a common bird in the lot. The collection is particularly rich in birds of striking appearance, very desirable for exhibition, some of them perhaps the most bizarre of their family. Among these may be



A STREET IN PARÁ



SITE OF BATES' CAMP, PARÁ

mentioned the Harpy eagle, hyacinthine macaw, hawk-headed parrot, spectacled owls, southern boat-billed heron and pileated herons.

The rarest is unquestionably the two-banded giant cacique (*Gymnostinops bifasciatus*), a large maroon-bodied, yellow-tailed oriole, of which only three skins exist in museum collections. It is a young bird, always clamouring to be fed, although quite capable of feeding itself. Equally rare in captivity are the tiny whispering ibises (*Phimosus infuscatus*) looking like half-grown glossy ibises with disproportionately short legs.

The specimens most valued by the writer on account of their scientific interest are three species of trumpeters, two of them new to us, the white-winged (*Psophia leucoptera*), the green-winged (*Psophia viridis*) and the dusky (*Psophia obscura*), bringing our species of these little-known birds up to four.

The excellent condition of the collection is shown by the fact that of the sixty-odd specimens of birds, after several weeks of acclimatization in the Zoological Park, only one has succumbed, and that through accident.

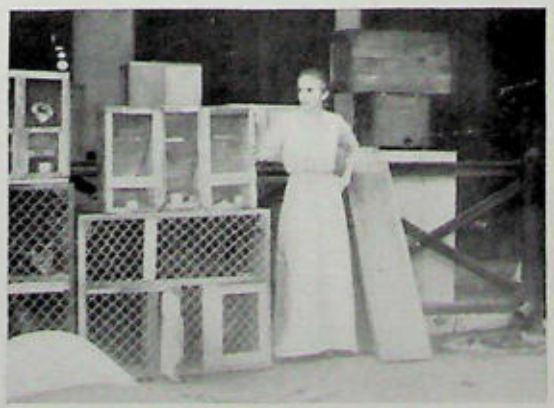
THE SOUTH AMERICAN COLLECTION.

By RAYMOND L. DITMARS.
Curator of Reptiles.

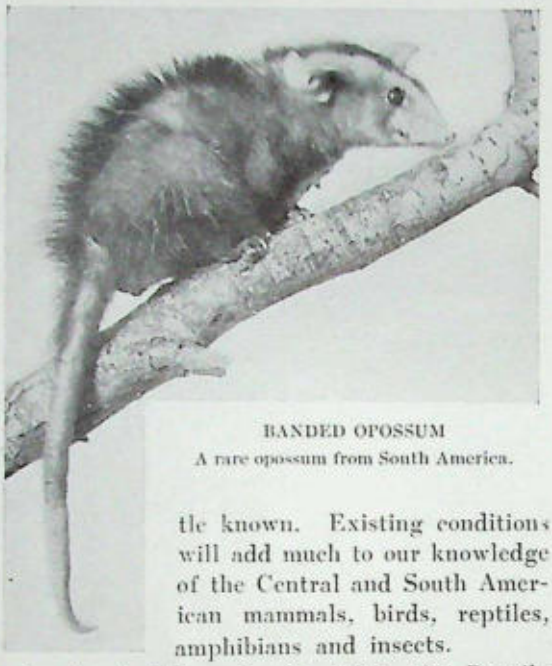
IN a previous issue of the BULLETIN, we explained the practical elimination of the Old World animal market by the war in Europe. It was noted at the time that South America would be a field of exploration for wild animals the present summer, and such has been the case. While there is a vast difference between the attractiveness of the tropical American fauna and the animal wonderland of Asia, the Malayan islands, Africa and Australia, there is nevertheless an immense field of interest in the former. Though the only large mammals are the tapir, the cameloids, the jaguar, puma and a few deer, there is an elaborate aggregation of small and medium-sized species and many of these are lit-



TROPICAL JUNGLE NEAR PARÁ



DR. SNETHLAGE
Director of the Museum and Zoological Gardens, Pará.



BANDED OPOSSUM
A rare opossum from South America.

tle known. Existing conditions will add much to our knowledge of the Central and South American mammals, birds, reptiles, amphibians and insects.

In two buildings in the Park—the Reptile House and Bird House—the arrival of a varied aggregation of tropical American specimens has resulted in the grouping of the new arrivals into exhibits that already occupy considerable space. This condition will soon be followed in the Small Mammal House and the Primate House. With the early summer we already find a considerable number of New World tropical species never before exhibited in the Park—and a few of them never previously exhibited alive either in the United States or Europe.

The mammal and bird collections were recently much strengthened with the return of Curator C. William Beebe, and his assistant, Herbert Atkin, from a purchasing trip to Pará. Among the noteworthy mammals brought north by this expedition was a series of rodents. One of these is particularly rare. This is a mature specimen of a large rat-like creature, with rather short tail, a photograph of which is herewith shown. Its coloration is dull gray with rows of whitish spots. In disposition it is calm and docile and it will permit the keepers to carry it about like a small dog. From various zoological records it appears that this species never before has been exhibited alive, unless in some collection in the immediate vicinity of its habitat—Peru. It is known as Branick's Rat, which title is partly a misnomer, as the animal is not a true rat, but forms a family by itself, consisting of a single genus and species. This family is technically recognized as the *Dinomyidae*, and in classification it stands between the *Dasyproctidae*—the agoutis and pacas—and the *Caviidae*—the common cavy, Patagonian cavy, capybara and allied forms. Other rodents in the new series are the handsome red agouti, the paca and the South American squirrel. Six specimens of the latter arrived. Among the flesh-eaters is a lively and attractive grison. This animal is not unlike the North American otter, though of more terrestrial habits. The back of this animal is a silvery gray, which hue abruptly gives way to black upon the sides. The grison's feet are distinctly webbed, but it does well without water. It is a bold, exceedingly quick and savage animal, and in a wild state preys upon small mammals, birds, reptiles and fishes. Mr. Beebe's trip also resulted in the addition of a variety of the ocelot or tiger cat that has not previously been exhibited here. This is a banded variety of rather elongated body. Its scientific name is *Felis pardalis chibigouazou*.

The South American reptile and amphibian collections have assumed really elaborate proportions. Of the highly dangerous poisonous serpents we now have on exhibition a large specimen of the bushmaster, three specimens of the fer-de-lance, two vividly marked rattlesnakes and two coral snakes. Of the mildly venomous tree snakes we are exhibiting about a dozen specimens, representing five species. Among these the most spectacular is the sharp-nosed tree snake, which illustrates a remarkable case of mimicry. These reptiles are about two and a half feet long, with very slender body. The head is much elongated and terminates in a very sharp snout. Form and coloration causes these snakes to look precisely like the stems and tendrils of vines. When disturbed they heighten the deception by swaying the neck and head like a branch or tendril that is vibrated by the movement of a bough or a breeze. Their food con-



BRANICK'S RAT
The name is partly a misnomer. The animal is not a true rat.



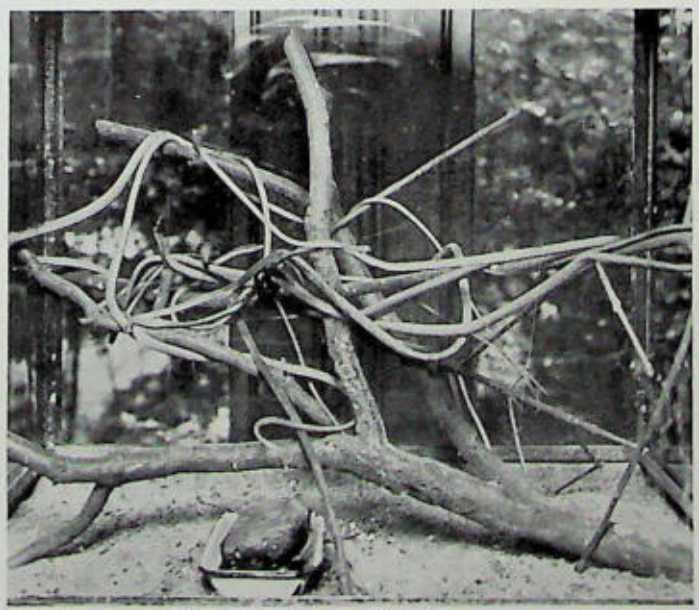
BLACK TEGU FROM SOUTH AMERICA
One of the oldest residents of the Reptile House.

sists of small lizards and they are provided with a poison that quickly paralyzes the prey. A photograph of these strange creatures is herewith shown.

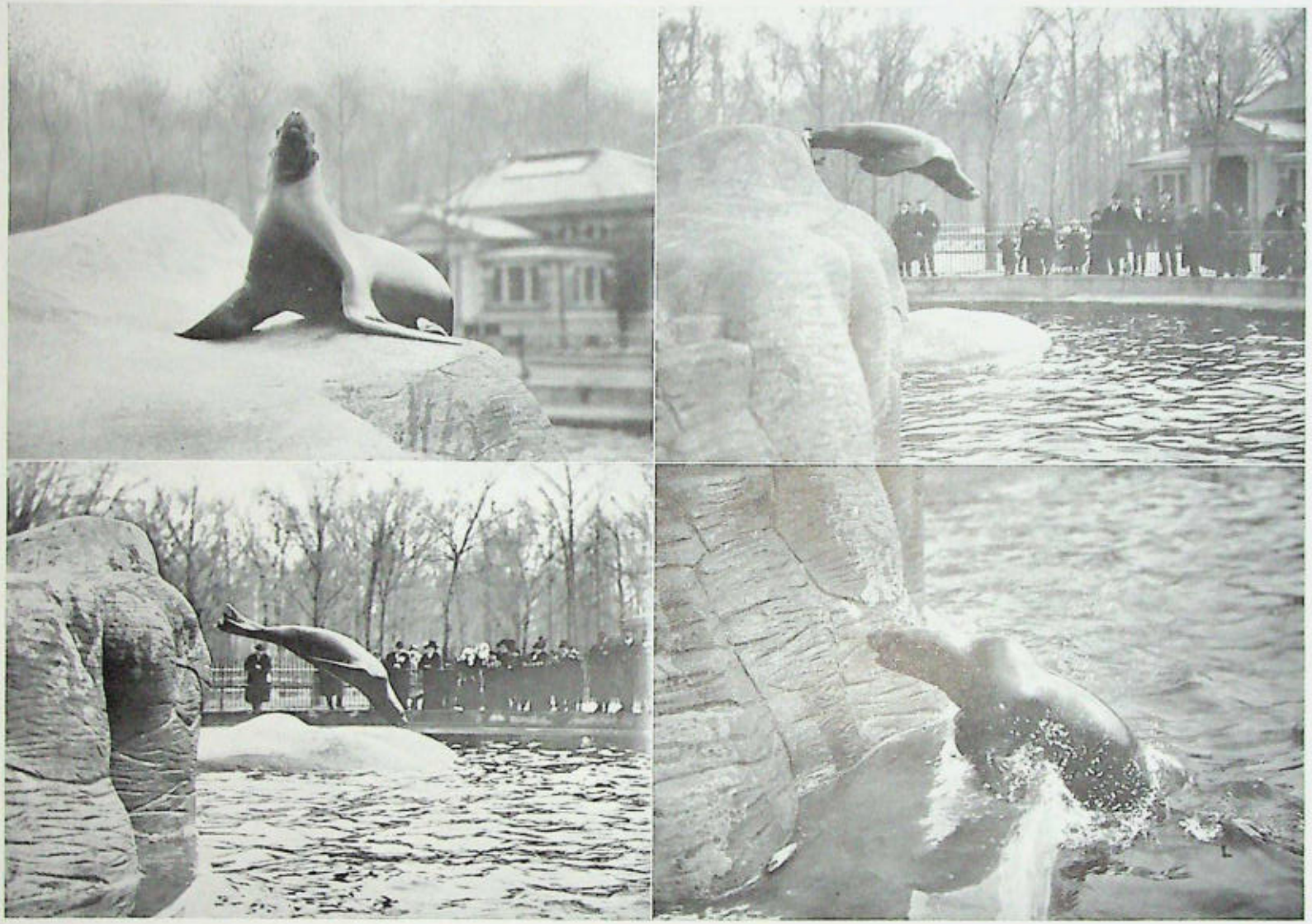
Most interesting among the series of South American non-poisonous snakes is the snake-killer, also called the Mussarama. This is a large, bluish-black serpent with smooth, lustrous scales. Our specimen is about five feet long, but the species grows larger. This snake attacks, kills and eats the deadly tropical vipers of the fer-de-lance type, and is immune to their poisons. Its method of attack is to tightly coil about the poisonous reptile, then squeeze it to death. Strangely enough the Mussarama is not immune to the bites of the brilliantly-colored and dangerous coral snakes that exist to the number of over a dozen species in South America. These coral snakes (*Elaps*) belong to quite a different family from that of the vipers. They are actually of near relationship to the Old World cobras and their venoms produce a paralyzing effect.

A fine series of South American snakes, lizards, turtles, amphibians and insects have been received from Mr. R. R. Mole, of Port of Spain, Trinidad. Mr. Beebe brought back several interesting turtles. Among these were two specimens of the giant river turtle of the Amazon region. These are scientifically known as *Podocnemis expansa*. The shell is nearly a yard in length and the weight slightly over fifty pounds.

With the *Podocnemis* came two specimens of the hideous Matamata, with a shell like that of a large snapping turtle, but distinguished by its remarkable head. The latter is about five inches broad, perfectly flat and abruptly terminating in a tubular snout about an inch in length. The eyes are not larger than the head of a pin, and to add to the altogether remarkable aspect is a row or fringe of fleshy protuberances on each side of head. Colored like the muddy river bottom, the Matamata lies in wait for small fish. Its only quick movement is a lightning-like dart of the head and capacious jaws armed with cutting edges as sharp as a knife.



SHARP-NOSED TREE SNAKES



FEEDING TIME AT THE SEA-LION POOL.

The sea-lions are the high-divers of the sea. The big Steller and the two California specimens attract large audiences to Baird Court by their wonderful diving.

THE ZOOLOGICAL PARK AND THE NATIONAL GUARD.

IN response to an application from Robert Lansdowne, of the Zoological Park force, who is a corporal in the 12th New York Infantry, the Director of the Zoological Park has received the following letter from the Chairman of the Executive Committee:

New York, June 24, 1915

Dear Dr. Hornaday:

I enclose a communication from Corporal Robert Lansdowne. I have no hesitation in ruling, on behalf of the Society, that a part of the burden of the military duty required by the State to qualify in the militia, should be assumed by the City and the Society without qualification, and I wish you would inform Corporal Lansdowne that his serving in camp will not in any way interfere with his regular vacation with pay. In other words, for such time as he is required by law to serve in training, he will be granted leave of absence with full pay.

Yours very truly,

MADISON GRANT, *Chairman.*

It is to be expected that all the institutions and departments of the City and State of New York and all public utility corporations will share the view set forth by Chairman Grant as the policy of the New York Zoological Society. The duty of the American people to the National Guard is in no sense a *question*, and therefore, it is not open to argument.

If an individual possesses a degree of patriotism which compels him to make an enlistment which commits him to risk his life in the defence of his country whenever his country gets into trouble and needs his services as a soldier, then it is not only right but necessary that his employers should help to bear a portion of the burden that he assumes. Thoughtful men know very well that men do not enlist in the national guard for any pay that their services secure in time of war. Every National Guard enlistment is based on good citizenship and patriotism; and every National Guardsman should receive a substantial sum in time of peace as pay for his service during his annual training. It is the duty of every state in the Union to enact a law providing for such payments from its public treasury, in order that the burden may be borne by the entire body of citizens rather than by the few. It is not right that the loss of time involved in annual training should be borne either by the guardsman or by his employer. The expense should be spread on the taxpayers as a whole. W. T. H.

A WAIF FROM THE SEA.

A NEW RECORD FOR THE WHITE-TAILED EAGLE

MANY storm-blown waifs have found a refuge in the Zoological Park through the agency of mariners who have saved their lives at sea. In former numbers of the BULLETIN, several such arrivals have been recorded, including a European heron, a European turtle dove, and a Greenland gyrfalcon. No less than ten rescued duck hawks have arrived at the Park during the past eight years, and beside these we have received a second specimen of the gyrfalcon, a gannet, an American bittern and several others.

The latest bird to be gathered into our collection by this unusual means, is a white-tailed eagle or gray sea eagle (*Haliaetus albicilla*), in juvenile plumage which flew aboard the steamer *Arundo*, off Nantucket, on November 12, 1914. Two days later it came to the Zoological Park through the kindness of Captain Wiedgen.

The taking of the bird at this point constitutes one of the very few records of its occurrence in North America, and apparently the first one of its appearance within the United States.

The white-tailed eagle breeds in the northern portions of Europe and Asia. It is resident also in Iceland and Greenland, but has never been recorded as breeding in North America. It has been reported from Cumberland Sound, in Baffin Land, and from Unalaska; and in 1898 an immature bird was collected on the coast of Vancouver Island.

The number of small migratory birds which are driven from their course during stormy weather and thus perish at sea, is admittedly great; but just why such powerful flyers as falcons and eagles should get into difficulties of this sort is not easy to explain. Possibly they are able to sustain their flight for longer periods, and thus can save themselves by taking advantage of the proximity of vessels.

Those individuals of the white-tailed eagle which breed in Greenland and Iceland are accustomed to fly southward through Europe during the severe cold of winter. Probably the bird secured by Captain Wiedgon was blown off its course early in the trip, so that it came down the eastern coast of North America, instead of the western coast of Europe.

L. S. C.

ZOOLOGICAL SOCIETY BULLETIN

Departments:

Mammals
W. T. Hornaday.

Birds
C. William Beebe.
Lee S. Crandall.

Aquarium
C. H. Townsend.
Raymond C. Osburn.

Reptiles
Raymond L. Ditmars.

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Elwin R. Sanborn,
Editor and Official Photographer

Vol. XVIII. No. 4. JULY, 1915

WILD LIFE CONSERVATION.

"Wild Life Conservation," by Dr. William T. Hornaday, recently published by the Yale University Press, has been given an extensive notice in the London *Atheneum,* which echoes the appeal for the benefit of our English cousins. The following paragraph is from a page review:

"It is a truism that America does nothing by halves. That by criminal folly a colossal heritage has been wantonly squandered none can gainsay; but, on the other side of the picture, the splendid efforts of an enlightened few have in recent years launched a scheme of systematic reparation on a scale which can only excite the envy and amazement of all who are working along similar lines in England. The problem in America is very different in its details from that which our protagonists have to solve, but the underlying principle is the same."

RABBIT DESTRUCTION IN AUSTRALIA.

Work of the Vermin Destruction Act in the State of Victoria, Australia.

From our Corresponding Member in Australia, D. Le Souef, Esq., Director of the Zoological Gardens of Melbourne, we have received the following report on the efforts now being made in Victoria to eradicate the rabbit pest.—*Editor.*

For the months ending February 28, 1915, about 45 million of strychnined apple and carrot baits have been used by this Department, and about five times that quantity in free-feed. Experience has proved that about seven poisoned baits to a rabbit is the fair thing. This would be about six and a half millions. There are the rabbits that are killed also with the phosphorized bait, digging out, fumigating, etc., which would be some millions more. Say a total of eight or nine millions equal easily to over a million sheep, or their equivalent. But these figures are nothing compared to the quantity the operation of the Act causes the deaths of. That is, of course, impossible to determine closely; but the only way to arrive at a knowledge of the vast quantity killed in the State is to go by the Government Statist's figures. Take 1913 as a basis, as I have not got the 1914 figures; and anyway, they were greatly affected by the war.

The total number of exported skins for 1913 was 24 *millions.* As a fair proportion is known to come over the border from the Riverina and also from Tasmania (of which no record is kept) say 20 millions from Victoria.

For many reasons the number of rabbits that are skinned is a very slight proportion, indeed, to those that are killed and not skinned. The immense quantities killed in summer are not worth the skinning. The enormous numbers of young ones are not worth skinning at any time. Of the rabbits killed by phosphorized pollard and grain, eight to one die in the burrows. The great number killed by fumigation are not even seen. In short, the many other ways and methods of killing them. How many landowners trouble to skin anyway? They prefer to look upon the rabbit in its proper light,—as vermin only. This brings the total to very big figures. I am, and so are my officers, perfectly satisfied that not more than one in twenty are skinned; and most landowners will bear me out in this.

Supposing, however, for argument's sake, the proportion is brought down to ten to one; we have then considerably over two hundred millions! Of course, this covers from the young rabbits in the nest, (untold numbers of which die when the mother is killed), to those in other stages of maturity.

I do not for one moment wish to claim the full credit of this vast destruction, but I do say that the controlling influence of the Vermin Destruction Act has a very large share in it. In this connection it is interesting to mention that the export of frozen rabbits in the same year was two million pairs. Can such a trifle be weighed for a moment against the vast good accomplished by dealing with the rabbit as vermin only, and not as a commercial commodity?

F. E. Allen,
Chief Inspector, V. D. Act, 1890.

DEATH OF GUNDA.

On the recommendation of the Director of the Zoological Park, and after full consideration by the Executive Committee, the Zoological Society authorized the death of its large adult male Indian Elephant, Gunda. Last week Director

Hornaday reported that instead of being this year in better condition than last year, as was hoped for, the elephant's state of erotic frenzy was worse than ever before, and as a consequence the animal was suffering from the restraints of captivity. For the first time in his life Gunda had ceased to take food, and his desire to kill someone had become more than ever the ruling passion.

Inasmuch as the animal was not enjoying life, and did not seem likely to do so throughout more than six months of each year, it was not kindness to prolong his life. While it would have been possible to continue to maintain him in captivity, his value as an exhibition animal was gone throughout six months of each year, and six months of animal quiescence are not sufficient to justify the endurance of the erotic period.

On Tuesday morning, at the request of Director Hornaday, and with the approval of the Executive Committee of the Zoological Society, Mr. Carl E. Akeley, the distinguished elephant hunter and elephant taxidermist of the American Museum, sent a bullet from his elephant rifle through the brain of Gunda, instantly and painlessly ending the life of the most troublesome and dangerous elephant that has come into public notice during the past fifteen years. The shot produced instantaneous paralysis of the brain and the whole nervous system, and was practically as painless as chloroform at its best. Director Hornaday and Keeper Thuman were purposely absent when the shot was fired.

Under arrangements previously made with President Osborn, of the American Museum, both the skin and skeleton of Gunda were preserved entire, for mounting. Immediately following the death of the animal, Mr. Akeley's corps of taxidermists and osteologists set to work to dissect the huge remains, assisted as far as possible by the Zoological Park force. The soft anatomy was taken in hand by a corps of preparators from the College of Physicians and Surgeons, and prepared for research work.

Keepers Thuman and Richards were congratulated by Dr. Hornaday on having cared for Gunda throughout five dangerous years with only one accident. In 1913 Thuman was very nearly killed by the elephant, and his life was saved by the fortunate presence and indomitable courage and good judgment of Keeper Richards. During the last weeks of Gunda's life, his antipathy toward Thuman knew no bounds, and even the sight of the man who for five years firmly held him under control always threw the elephant into a rage.

THE ELEPHANT HOUSE ROOF.

When the elephant house was constructed by Nesbith & Co., the sub-contractor for the roof failed to comply with the specifications. As a consequence the roof of the main structure proved to be anything but waterproof, and in a short time the leakages that took place very seriously damaged the building. Eventually the roof of the entire main structure had to be reconstructed in accordance with the specifications. This was done by the city and at the same time an action was brought against Nesbith & Co., to recover the cost of the work.

At that time there seemed little prospect that the cost of the work could be recovered, but the result has surpassed those expectations. The action has recently been settled by the payment to the city of $4,500. This sum comes from the two surety companies that were on the bond of Nesbith & Company. In view of the damage to the Elephant House, and the very great annoyance that was caused to the Zoological Society by the leaking roof, the result recently achieved is highly satisfactory.

It has seldom happened in the history of the City of New York that contractors engaged in public work have been punished for their misdeeds, and the Society feels gratified that it has been the means of bringing one offender, at least, to justice.

NEW MEMBERS

MAY 1, 1915—JULY 1, 1915.

LIFE MEMBERS.

Goldschmidt, S. A.,
Soher, LeRoy,

ANNUAL MEMBERS.

Artz, C. W.,
Ballard, Edward L.,
Bannard, Otto T.,
Bartol, Henry G.,
Beebe, Walter H.,
Champollion, Mrs. A. C.,
Coe, Charles A.,
Connell, Herbert Stanley,
Coriell, Wm. Wallace,
Durkee, A. W.,
Evans, S. M.,
Fleischmann, Udo, M.,
Greene, Jr., G. S.,
Harrison, Archibald,
Heide, Jr., Henry,
Hodges, Harrison B.,
Konta, Alexander,
Kuhn, Julius,
Lester, George Bacon,
Lever, S. H.,
McCoy, Dr. John,
Markham, Robert D.,
Marye, R. V.,
Miller, Mrs. E. C. T.,
Norton, W. P.,
Raymond, H. E.,
Renshaw, Howard Price,
Ronalds, Mrs. George L.,
Rothlauf, Rev. Anthony J.,
Ruhl, Louis,
Russell, Mrs. Wm. H.,
Scott, Thomas Blythe,
Stuart, Robert,
Sturges, Mrs. E. C.,
Swords, William Voorhis,
Suydam, Jr., Lambert,
Thomas, Mrs. Howard L.,
Thomson, Giraud F.,
Vanderpoel, Mrs. Mary V.,
Varian, Mrs. Wilbur L.,
Waller, Stewart,
Whitehouse, Norman
Zentgraf, Rev. George J.,



TYPES OF BIRD HOUSES
Shelters for bluebirds and owls, and a device for holding suet.

ATTRACTING BIRDS.

Appliances for Encouraging the Return of the Birds.

By Lee S. Crandall,
Assistant Curator of Birds.

NOW that the great battle has been fought and won for the legal protection of our smaller birds—known collectively as song birds, although many do not sing—the question arises as to how best to help them to regain an approximation of their former abundance. Examination of the conditions brings to light the fact that actual persecution at the hand of man has not been the only cause of the diminution of birds. This direct method has been complemented by a far more insidious means, and one which cannot be so easily combatted.

When the colonization of America commenced, it is easy to imagine that some stimulus may have been given to certain small birds—more especially those which habitually nested in hollow trees, and excavations in dead stumps. The clearing of ground, which left many stubs, and the establishment of orchards, meant a great multiplication of nesting sites and an increase of feeding grounds for those species which preferred open country. But with the density of population constantly increasing, more care was devoted to the conservation of forests, and today the application of modern forestry methods has so trimmed the branches of the old orchards, and so carefully removed all dead or decayed forest trees, and insect-harboring undergrowth, that many of our useful birds are hard pressed indeed to find a cranny in which to deposit their eggs, or cover in which to search for food.

The red-headed woodpecker, once common about New York, is now rarely seen, and for the first time in many years, a pair is nesting this spring in the Zoological Park. European starlings and sparrows occupy the few remaining holes suitable for the nests of bluebirds and, excepting during the migration period, the querulous notes of this beautiful songster are wanting from our parks and suburbs.

Since it is evident that this condition has been brought about directly by us, it is equally obvious that it rests with us to remedy it as far as lies within our ability. Fortunately the means is at hand, and its application is of direct and permanent value to many of the birds we most desire to benefit.

Suitable nesting boxes are available and can be substituted for the vanished dead limbs, and various devices have been originated for holding food to help the little feathered winter visitors maintain themselves. Even during the summer months, when food is more abundant, a few birds will be found visiting the food depots. For the purpose of disseminating knowledge concerning the use of such apparatus, the Zoological Society has established an exhibit of these contrivances in the Park, and some notes concerning the more important ones may be of interest.

Perhaps most valuable, because satisfactory results are certain quickly to be obtained, are the feeding shelters. Of the stationary type, that manufactured by the Jacobs Bird House Co., Waynesburg, Pa., is an excellent example. It is strong and well made, the roof being carefully tinned. The sides are of glass, which furnishes protection for the feeding birds, allows light to enter and permits the host to see the visitors. Birds may be somewhat shy of feeders of this sort at first, but once they have become accustomed to its use will visit it constantly. Food trays of similar construction, or simple platforms either covered or open, can be easily made.



PICTURESQUE BIRD-HOUSES
Composition shelters, imitating wood.



SHELTERS MADE FROM LOGS
Simple structures, but very substantial.

Several models of the weather vane food shelter, which seems to have been originated by William Dutcher, are made, and are very successful. The one manufactured by the Audubon Bird House Co., Meriden, N. H., is large and so well balanced that its glass-covered back is always turned toward the wind; the leeward side remaining an open invitation to hungry birds. That of the Farley & Loetscher Mfg. Co., Dubuque, Iowa, is smaller and without the glass, but otherwise seems satisfactory.

Of the portable sort, the feeding car made and sold by Joseph H. Dodson, 701 Security Building, Chicago, is to be recommended. The car is provided with small wheels which travel on a wire, gravity being the propelling force. It can be run from a window or other convenient point, and suspended in a position which otherwise might be inaccessible.

The automatic feeder made by the Maplewood Biological Laboratory, Stamford, Conn., is an adaptation of the usual self-feeding hopper in use among poultrymen. It is furnished with a wide board for protection from rain, and its use makes certain a supply of food, even if it is not regularly visited by the host.

Suet holders furnish the simplest and perhaps also the best method of feeding insectivorous birds, such as woodpeckers and nuthatches. The Simplex Bird Apparatus Co., Demarest, N. J., and Chas. E. White, Kenilworth, Ill., make metal baskets which are well suited for the purpose.

About New York, the birds most likely to be attracted to food depots are the following: Blue jay, downy woodpecker, hairy woodpecker, flicker, nuthatch, brown creeper, chickadee, white-throat sparrow, song sparrow, tree sparrow, junco, siskin, purple finch and possibly the cardinal and tufted titmouse. Woodpeckers and nuthatches will visit the suet chiefly, blue jays will eat almost anything. For the finches, a mixture of various seeds should be provided —sunflower, hemp, canary and millet are among the best, although any nourishing, assimilable grain will do. Bits of dry bread and nut meats are relished by many birds.







There can be no doubt that suitably placed bird houses are a very potent factor in the encouragement of birds. If the locality is at all favorable, and a little thought be given to construction and especially to location, it will be found that birds will take possession of them. It is a strange fact that while birds will frequently ignore elaborate structures, they often will unhesitatingly occupy the most unpromising cavities. Empty cans, old hats, and the roughest of boxes, seem to offer all that the home-seeking bird desires.

MARTIN HOUSE AND TYPES OF FOOD CARRIERS

One small food-car can be pulled to the window, filled with food and run back on the cord that suspends it.

Hence, it follows that any boy can build suitable bird boxes for himself that are as likely to be found acceptable as any others. Those who lack the time or ingenuity for this work, will find the market well supplied by a number of manufacturers.

The marked colonizing habits of the purple martin have given opportunity for great range of taste in the erection of houses for their occupation, and elaborate structures, many perfectly practical as well, are made at prices ranging to $50 or more each. Joseph H. Dodson, the Jacobs Bird House Co., and several others, offer a variety of such houses. A small one, cheap but efficient, is made by the Farley & Loetscher Mfg. Co.

Of single nest-boxes for small birds, there is great diversity of style, but after all there are but two main types—the hollowed natural log and the artificial house of boards. The manufacture of the first has been found very difficult because of the oddly-shaped bore which is required. The necessary machinery has now been imported by the Audubon Bird House Co., which offers nesting logs of six different sizes. These logs certainly offer the closest approximation to natural nesting sites that can be produced, and birds take to them with confidence. It has been found, however, that in many cases artificial houses have proved even more satisfactory.

Of structures of the usual bird house type, there is an endless variety. Only the bounds of mechanical possibility limit their range, and many ingenious ideas have been worked out. But it must be noted that simplicity should be the keynote, for plainness is far more likely than the most decorative productions to prove attractive to birds.

Practically all of the manufacturers of bird appliances offer birdhouses of many styles. The plain brown bluebird and wren boxes of the Jacobs Bird House Co., have much to commend them. The Farley & Loetscher Mfg. Co. makes very cheap but practical little houses which are well adapted to meet the needs of birds. Tiny cylinders of roofing material, made to represent miniature logs, are made by Winthrop Packard, Canton, Mass. They are well able to withstand the effects of weather, if not too much exposed to the sun, and are said to be used freely by birds. The wren, chickadee, bluebird, titmouse and woodpecker houses, made by Louis Kuertz, Loveland, Ohio, are very attractive from a decorative point of view, and still retain the essentials of practicability.

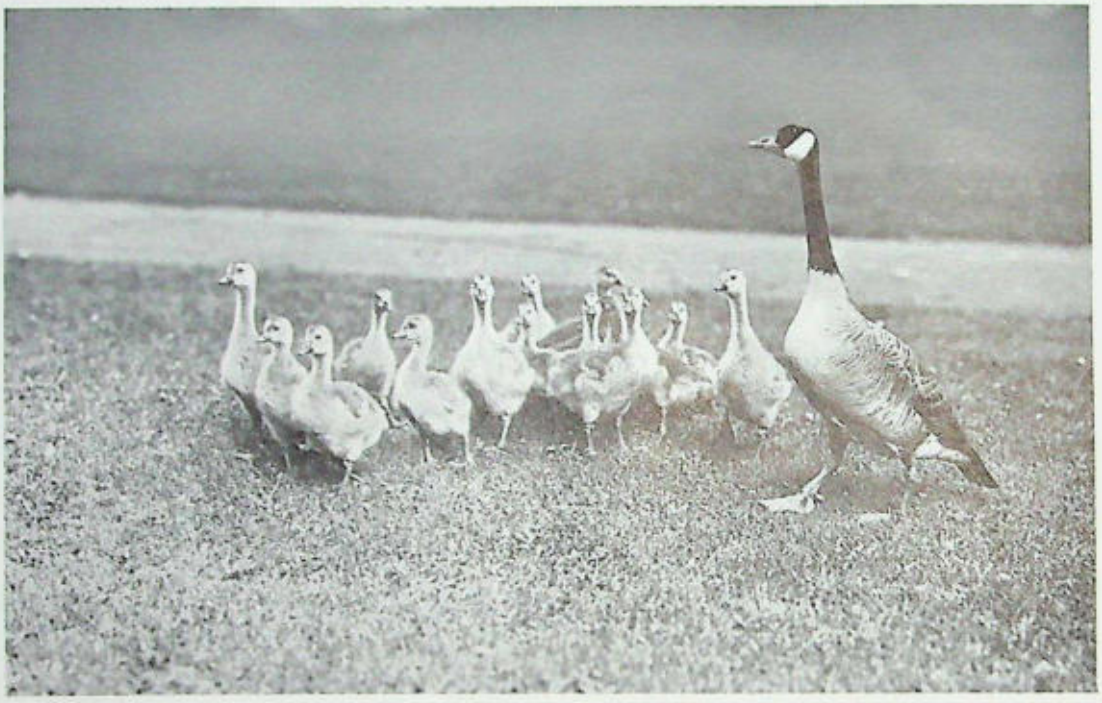
The birds which are likely to occupy houses in the vicinity of New York are the following: Bluebird, crested flycatcher, purple martin, tree swallow, chickadee, flicker, house wren, starling, European sparrow, sparrow hawk, screech owl and possibly also the nuthatch, Carolina wren, tufted titmouse and downy woodpecker. Robins and phoebes will nest on open shelves, which can be provided with a rim to hold the nest and a simple roof for shelter. Starlings and sparrows, unfortunately, nest in holes, and their pugnacious dispositions are too much for the smaller native birds. The bluebird can be protected from the starling by making the entrance holes one and one-half inches in diameter, which is too small for the latter. It will not, however, exclude the sparrow. Martins like entrance holes at least two inches in diameter, but can squeeze through one and one-half if they will. Chickadees and wrens are protected by holes seven-eighths to one and one-eighth in diameter.

Some discrimination must be exercised in placing boxes according to the habits of the birds they are expected to attract. Bluebirds are most likely to nest in an orchard, or rough pasture, although they will often come close to houses. This applies also to flickers, crested flycatchers and chickadees. Wrens will nest in boxes attached to buildings, or placed on poles nearby. Tree swallows will occupy boxes a few feet above the ground, on poles, especially where it is marshy, and martin houses should always be entirely in the open, well away from trees. In general, boxes should be placed from six to twenty feet from the ground, and those on poles or in isolated trees are more likely to be occupied than those situated in thick woods.

AMBITIOUS WILD GEESE.

OF late years, much time and energy have been expended in the attempt to systematize the propagation of game birds. Some species have been found readily adaptable to the conditions of the game farm, but others have not proved susceptible to the efforts of the experimenter.

Wild geese fall, decidedly, in the latter class. There are no American, and few European records of the successful breeding of any native species, with the exception of one—the Canada goose. This fine bird reverses every tradition of the habits of wild geese in captivity and under suitable conditions is no more difficult to breed than the barn-yard varieties. It is only necessary to provide a mated pair of mature age with an acceptable nesting site, plenty of grazing ground and freedom from disturbance,



CANADA GOOSE WITH HER KIDNAPPED GOSLINGS

and a successful outcome is almost a foregone conclusion.

Under the able protection of the gander, the goose incubates the eggs for a period of about four weeks. When the young, usually four to seven in number, finally emerge, they proceed at once to the main occupation of their lives—grazing. And, carefully guarded by the parents, they continue to graze until they assume amazing and unwieldy proportions, soon equalling the bulk of their parents.

In the Zoological Park we have reared yearly a goodly number of Canada geese, our flock of these birds now numbering more than fifty. In the spring of 1915, the usual number of pairs nested, and succeeded in hatching their goslings. But one curiously acquisitive and equally pugnacious pair, apparently dissatisfied with their own brood of five, decided to increase it. By means of a system of brow-beating on one hand, and persuasion on the other, they actually succeeded in abducting the goslings of other birds until they had gathered a flock of fifteen; a number entirely without precedent in the writer's experience.

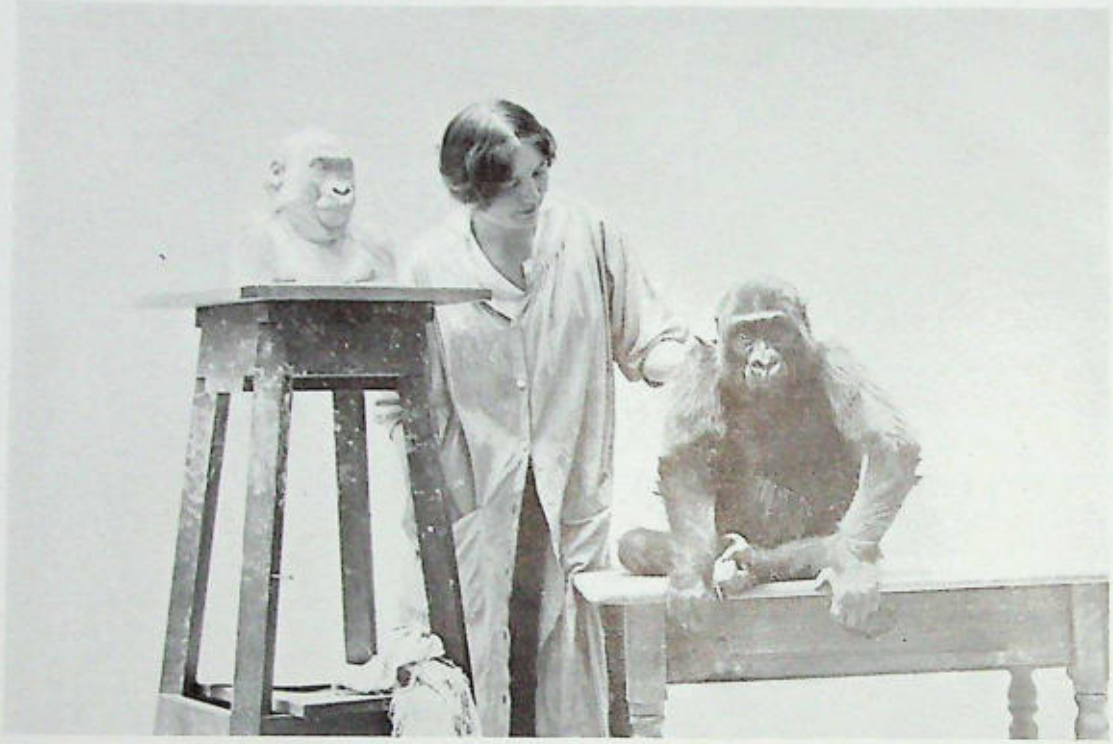
The trouble of the "old lady who lived in the shoe" was caused by the fact that she didn't know what to do with so many. Our geese never betrayed any such tribulation, and while there was some scantness of space beneath the sheltering feathers of the mother, the overflow could always collect alongside and receive a share of warmth. All are being safely reared, and the excellence of their care is attested by the evident prosperity of the goslings, as shown in the accompanying picture.

L. S. C.

ITEMS OF INTEREST.

An Interesting Family.—The strange little raccoon dogs from Japan are happy in their possession of a large and interesting family. We had noticed for some time a habit of the mother to hide away under her shelter house where she had been busily engaged digging. With the arrival of the first summer days the bright sun tempted forth nine little dogs which are very woolly and playful. The appearance of these progeny was a surprise to the keepers. These youngsters should be a delight to the children throughout the summer.

The Gorilla.—After completely recovering from a serious illness of the past winter, Dinah, our now famous gorilla, is suffering a relapse of the paralysis that so suddenly attacked her. Dr. Blair explains that this condition is brought about by malnutrition of the bones. Since the second attack she has shown signs of improve-



A REFRACTORY BUT FAITHFUL MODEL.

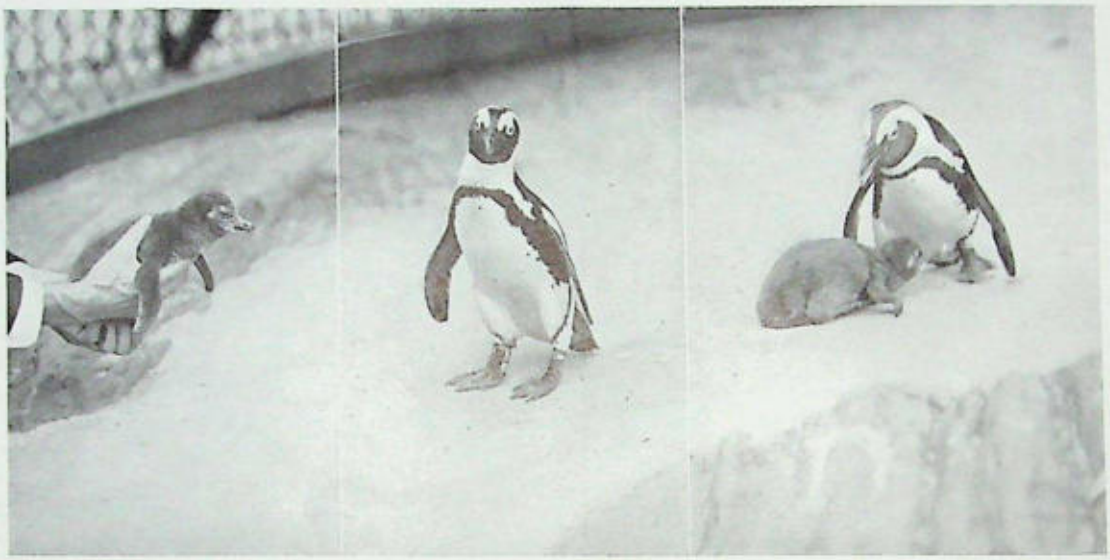
Miss Shonnard has completed a very life-like portrait bust of our gorilla. A copy in bronze has been purchased by the Society.

ment, and we hope that she may once again attain her former state of good health. Her diet is carefully studied and she is most of the day in a sunny cage playing with a small bull terrier. Dinah is very fond of this little dog and is vigorously demonstrative if it strays away from her.

A New Orang.—We have been fortunate during the stringency of the European animal market caused by the war, to obtain a very well-developed and healthy young male orang-utan. This animal is about two years old and of the dark-faced phase, which type of orang has been found to best survive in captivity. Dr. Hornaday has named the new arrival Datu, which is the name of the leader of a tribe in Borneo. Datu is of a different disposition from the little orang which has been in the Park for some months. He is confiding and not at all stubborn. The collection of anthropoids now contains a gorilla, one chimpanzee, two orangs and three species of gibbon.

Burmese Ape.—It has been eight years since a specimen of the Burmese ape has been on exhibition at the Park and previous to the arrival of this exceptionally fine example of the species that we have just received, we have had but two small animals of the kind. Our new representative of the Burmese ape is a very powerful animal with short, muscular arms, thick set neck and clad in rather woolly, brown hair. While Pete looks morose and formidable, he is in every way friendly, which is a condition not common among adult specimens of the larger macaques.

Rare Small Mammals.—We have noted that the arrival of one rare animal brings another. As an example of this we remember a past experience, when we hoped to obtain a specimen of a mongoose, for which we had been waiting several years. A circus happened to dispose of its stock and from this source a mongoose was sent to the Park. A few days later a pair was presented by a gentleman returning from India, and almost immediately after three additional specimens came from an entirely different source. This also happened with cobras which we had sought for two years' time. Within thirty days one was purchased from a dealer, two were presented by a sailor and two were shipped in from a scientific expedition. This interesting condition of unexpected appearances of rare animals was repeated a few weeks ago. The Collins-Day South American Expedition presented to the Society three specimens of the



A RARE AND INTERESTING FLEDGLING

A young penguin was hatched in the Park in May, 1915. It is the first event of its kind in the United States. The parent birds are very solicitous for its welfare and are rearing it with the utmost tenderness. While the keeper holds it, the mother is much disturbed, and hovers over it joyfully when it is released.

black tamarin, a rare marmoset which had never previously been exhibited in our Primate House. Within a few weeks after we had received these black tamarins, Curator Beebe returned from a scientific mission in South America and brought three additional specimens from Pará.

The Passing of Sultan.—The venerable lion, Sultan, is no more. Owing to his advanced age and great infirmity, he was mercifully chloroformed by Dr. Blair. During his prime, Sultan was a favorite with painters and sculptors and has been the model for many notable works of art. While the average age of a captive lion is thirteen years, Sultan has been a docile captive for about seventeen years' time. Although not an exceptionally large animal, he was justly celebrated for his fine lines and luxuriant mane. It could be truly said that Sultan was most majestic and dignified.

Our Powerful Elephants.—Owing to the rapidly increasing size and strength of our male African elephant, Khartoum, it has been found necessary to substantially strengthen the structure of his outside enclosure. With Khartoum's growth has come a marked inclination to damage everything within reach. He has bent gates, broken trees, loosened the masonry and strained doors until it has been necessary to make his quarters practically armor clad. The addition to the outside structure consists of railroad iron of about 70 lbs. to the yard, bolted to the top of the fence, and each post has been provided with a heavy T-iron brace running five feet into the ground and anchored in cement.

An Active Rhino.—The strength of our adult rhinoceros was an unknown quantity until demonstrated by a recent performance of Victoria in one of the yards of the Elephant House. To keep this animal from rubbing her horn against the iron of the outside fence an inner pipe fence was constructed. The latter consists of two pipe rails about a foot and a half apart. The pipe is of two-inch external diameter and of galvanized iron. During the recent cold weather the rhinoceros was shut in her stall for fully two weeks time and upon her release she was seized with a desire to play. She charged the pipe fence and not only bowed the lower two-inch pipe, but completely broke the upper pipe rail. From an examination of this clean break it would appear that a power nothing short of dynamite could affect the damage caused by the charging body of this animal.

Our Retiring Giraffe.—With another summer passing by, the idiosyncrasy of the male giraffe to remain in-doors continues. For two years this animal has gazed from his open door and stubbornly refused to leave his stall and wander about in his spacious outside yard. Repeated coaxing of his keepers, the placing of food outside, prodding and threatening are unavailing. We think that this animal at some time has bruised his head in going through a door that

was too low and the memory of the incident still lingers.

Irrepressible Wild Swine.—The wild swine collection in the Small Deer House now consists of a South African wart hog, a bush pig and several specimens of collared peccaries. Visitors often comment upon the rough condition of these yards, which have often been repaired. These animals delight to root and dig and have exhumed rocks as large as cobble stones and constructed wallows. The yards have been repeatedly filled and rolled, but the upheaval process is continuous. These animals are particularly fond of lying in a mass of rubble turned up in recent digging operations.

Prolific Prairie Dogs.—The prairie dog village is now at its best. There appears to be about one hundred young dogs of various sizes. There is much chattering and confusion as to the ownership of the home burrows. A ludicrous sight results when the keeper steps within the enclosure to distribute the food. There is a dash for the holes, which results in individual parents heartlessly ejecting youngsters that belong in other burrows. The excitement continues until all of the little prairie dogs have located their respective parents.

Rare South American Snakes.—Within the past two weeks we have received from South America a fine specimen of the bushmaster snake, fer-de-lance, two coral snakes, emerald whip snake and the interesting Mussarama. The latter is a smooth and glittering black snake, about five feet in length, that preys upon poisonous snakes. It constricts them to death and during combats with venomous reptiles is often bitten, but is immune to their poisons. At least eight species of South American amphibians have been added to the collection, as well as a number of lizards.

Silk Worm Cocoons.—A very interesting collection of silk worm cocoons is now on exhibition in the Reptile House. The worms were raised from eggs, grew at a marvelous rate and fed upon mulberry leaves. When they attained their full size they were about two and a half inches long and three-eighths of a inch in diameter. They were of a bluish white and appeared to be dusted with a fine powder. The cocoons finally spun by this colony, are of a soft and lustrous yellow silk. The moths will hatch in about two weeks' time. While both the males and females of the moths have wings, the females are very heavy-bodied and cannot fly.

R. L. D.

A VISITING HERRING GULL.

THE lovely plumage and graceful flight of the Herring gull make it a much admired creature, and for many years we have wished to claim it as one of the unfettered inhabitants of the Zoological Park. On various occasions, transient birds have appeared not impervious to the cozening influence of cut fish, spread for the delectation of our colony of night herons, but never could we induce one to spend more than a few days within our boundaries, or to endure any hint of familiarity on the part of visitors. In 1912, a young bird was reared in the Goose Aviary, by a pair of captive birds, and when we allowed the fledgling to roam at will, as soon as his wings could support his small weight, we felt that the first step toward the colonization of the herring gull had been taken. But, true to the precedent set by others of his obstinate race, he waited only long enough to perfect himself in the art of flying, before setting out for a habitation apparently more congenial. This unexpected result of our plans put a decided damper on our enthusiasm, and we gave up as hopeless all thoughts of a colony of herring gulls.

With the return of the birds from their northern breeding grounds, in the autumn of 1913, nothing occurred to revive our slumbering hopes. But during the early part of the winter of 1914, gulls in unusual numbers were seen passing over the Park on their way from the Hudson to the Sound, and finally came the news that several were feeding with the night herons.

These birds, unlike their predecessors, seemed to have little fear, and after a few weeks spent on Lake Agassiz, in the company of the herons, one felt himself enough at home to visit the Wild Fowl Pond. This he must have found to his liking, for he at once established himself there, and was to be seen daily, performing the remarkable aerial evolutions of his tribe, or sunning himself on the rocks along the shore. Frequently, he devoted himself to awkward but business-like diving for purely imaginary fishes, rising above the water and plunging beneath the surface with a persisteney and energy which, from its uniformly negative results, caused much merriment to an increasing gallery of visitors.

It may have been the barrenness of the fruits of this line of endeavor which caused him to observe the ease with which the ducks secured sustenance. At any rate, he soon began to hover about the outskirts of the flock which passes its leisure in begging tidbits from the crowd of too-willing spectators. He could not summon sufficient courage, however, to push



EMU AND YOUNG BIRD HATCHED IN THE PARK

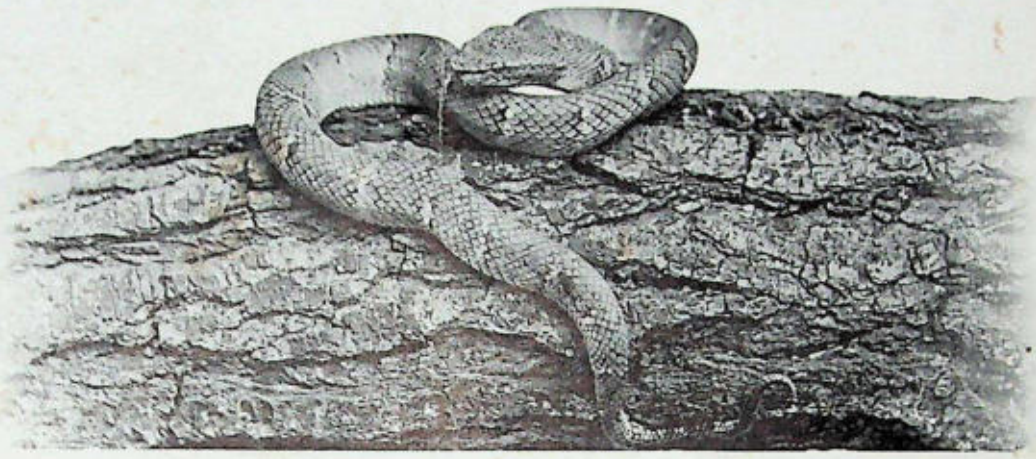
The male bird incubated the eggs and the young specimen shown in the picture was the outcome of his perseverance. The fledgling is growing rapidly.

himself into the front rank of the expectant birds and found himself, as a simple swimmer, unable to compete with his more efficient rivals. Gulls are not lacking in ingenuity, and he soon devised a plan which would secure to himself all that even a gull's appetite could desire. Holding himself in a watchful attitude, he would wait for a bit of bread to be thrown, and as soon as it was seized by one of the eager ducks, would proceed with an act of piracy. Rising lightly from the water, he would dash with mock fierceness at the unfortunate bird, which, surprised by finding a rival above it, and perhaps frightened by the spread of beating wings, would drop the morsel and wildly flee. A single gulp sufficed to place the booty beyond the reach of more courageous contestants, and the thief was again ready for business.

Gulls, as a group, are well known to be predaceous, according to their needs and the relative abundance or scarcity of weaklings upon which to prey. The skua habitually secures the major portion of its food by forcing less savage relatives to disgorge their captures, and it is not remarkable that our gull should avail himself of a similar strategem.

The antics of the bird caused a great deal of amusement for a time, and we were becoming more and more pleased with our visitor, when suddenly, no doubt elated by his success, the gull commenced operating in a larger field. Selecting a lone duck, well in the center of the pond, he would stoop at it fiercely, causing the victim to dart beneath the water. Hovering hawk-like overhead, the persecutor waited for it to reappear and repeated the performance. At first we thought this entertaining, but soon it was observed that the gull, all too evidently, was laboring with sinister intent. Much as we had enjoyed his visit, it was certain that he had out-stayed his welcome. The bird's failing for cut fish was utilized to coax him within the trap which completed his final downfall, and now, in company with others of his kind in the Goose Aviary, he is meditating on his misdeeds.

L. S. C.



ZOOLOGICAL SOCIETY BULLETIN

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A GIANT BEAR FROM THE FAR NORTH

This Alaskan Brown Bear establishes an extreme northerly record. He was captured near Kabuk, northern Alaska, north of the Arctic Circle and but 300 miles south of Point Barrow.

ZOOLOGICAL SOCIETY BULLETIN

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THE BREEDING OF THE EMU

By LEE S. CRANDALL,
Assistant Curator of Birds.

THE domestication of the ostrich, which without doubt has saved that bird from extermination, is now so well established that its propagation is carried on as simply and systematically as that of the common fowl. The great ranches of the west yearly produce their hundreds of ostriches, while on the well-established farms of South Africa even greater numbers are reared.

This interest in ostrich breeding has originated, of course, from purely commercial sources. The wild birds were yearly becoming scarcer and the demand for plumes constantly increased. Progressive settlers conceived the idea of rearing ostriches in captivity, and once the start was made, and the experiment proved successful, the movement quickly spread. The production of plumes is now one of the great industries of South Africa, and is destined for a similar future in America.

The mere fact of the low market value of the plumage of other struthious birds—rheas, cassowaries and emus—accounts for their never having been thoroughly domesticated, as has their greater congener. Cassowaries, it is true, with their unconquerable pugnacity, present great difficulties to the would-be breeder, and there is no record of their reproduction in confinement. Moreover, the birds cannot endure cold or dampness, and require warm housing in winter.

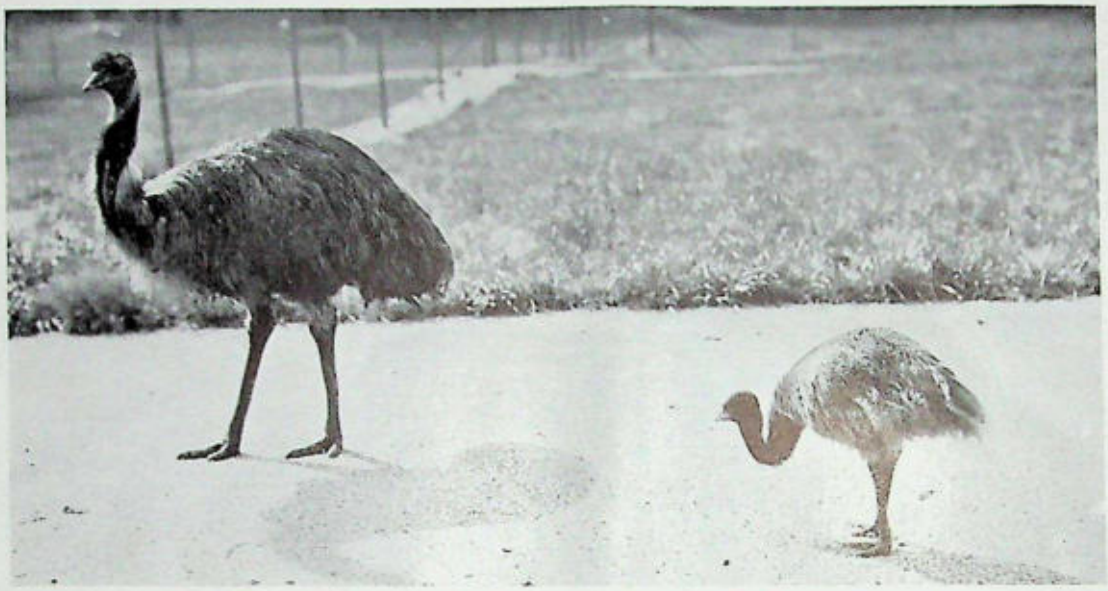
Rheas have been bred in England on several occasions. The rearing of the young birds appears to present no particular difficulties, and has generally been left to the parents, or at least to the father, for once the eggs have been laid, the female takes no further interest in their welfare. These birds are perfectly hardy and there is no reason to suppose that their artificial cultivation could not be made as thoroughly successful as that of the ostrich. The only missing factor is the stimulation of pecuniary reward. For the sake of the preservation of the rhea, which is rapidly becoming reduced in numbers, it is almost to be hoped that this lack may sometime be supplied.

In 1914, a pair of Great-billed Rheas (*Rhea americana*) nested in the New York Zoological Park. Although the male bird incubated faithfully for the required period of six weeks, his efforts were in vain, the eggs proving infertile. The rhea has yet to be bred in America.

Emus, although less quarrelsome than cassowaries, still are sufficiently choleric to make their keeping a matter of some difficulty. Still, they are bred occasionally in England, though not so frequently as is the rhea.

In 1914, on the completion of the new Yak House, our flock of emus was removed to commodious quarters there. It was soon found necessary to separate a pair of adult birds from four younger specimens, because of their constant quarreling.

This pair passed the following winter entirely without heat. During the day they ploughed through the snow of their large corral, and at night were driven into a small vestibule, not more than six feet square.



THE EMU FAMILY

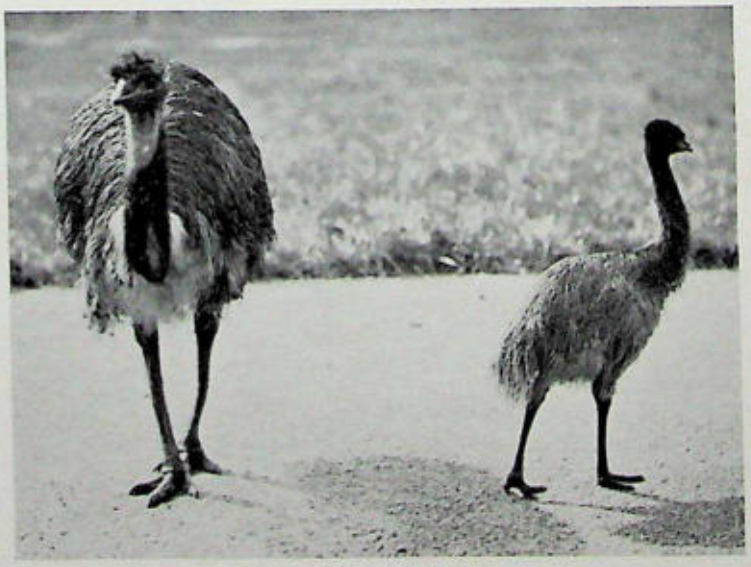
The youngster is now entirely clothed in feathers, and has reached half its father's height.

One frosty day in January, a great green egg, beautifully embossed in a darker shade, was found in the sand of the vestibule. This event was not unexpected, and a large, oval stone, painted a delicate green, was substituted for the egg, which would soon have frozen if allowed to remain where it was deposited.

At intervals of about five days more eggs appeared, until a total of six had been laid. Our supply of egg-shaped stones was soon exhausted, but evidently enough were left to satisfy the birds. On February 18, the male was found established in a shallow depression in the sand, fondly covering three green stones. It was evident that his intentions were of the best, and the six eggs were quickly substituted.

Then followed a trying vigil, the longest required of any bird. The female wandered in and out, taking small interest in the proceedings, but for a period of more than eight weeks her mate was never seen to leave the nest. When feeding time arrived, he would rise on his tarsi and eat greedily, but as soon as his appetite had been appeased, he at once settled on them again. After incubation had progressed for some weeks, it was found that unlike brooding domestic hens, the emu was becoming enormously fat, so that it became necessary to greatly reduce his ration.

After two weeks had passed, the eggs were examined and three which were found to be infertile were removed. On the fifty-eighth day, the faithful service of the bird was rewarded by the appearance of a fine, healthy chick. Of the two remaining eggs, one, already chipped, rolled from the nest and became chilled,



MALE EMU AND CHICK

while the young bird contained in the other appeared to lack vitality, and failed to emerge.

The young emu stood about six inches high. It was beautifully striped with white and brown longitudinal bands, each dark one being centered with a lighter zone. The legs were strong and well-developed, and from the first the little bird was able to run about actively.

About this time, the male's dislike for the presence of his mate became decidedly marked, and it was necessary to remove her to another enclosure. This step evidently had the full approval of the father, which at once became much more quiet and docile.

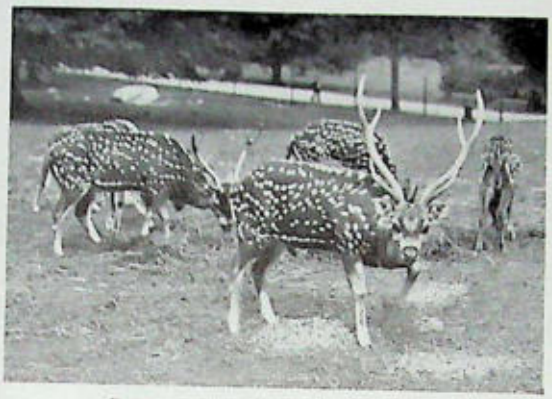
Soon after hatching, the chick took its first meal of finely chopped lettuce leaves. It was not long before it accepted the addition of boiled egg and ground zweibach, a diet on which it throve mightily. When the youngster was about six weeks old, the egg was omitted, and Spratt's Game Food substituted for the zweibach, a change which seemed perfectly agreeable.

For the first two weeks of its life, the young bird's chief ambition appeared to be to escape from its enclosure, an object quickly achieved by means of impassably small apertures. It was necessary, therefore, to confine the one-sided family in one of the inner cages of the Yak House. At the end of this period, the father's control seemed better established, and the odd pair was given the freedom of the paddock.

The youngster grew amazingly. Early in July, feathers began to replace the thick down of the head, rapidly spreading down the neck. At this time, when the bird stood erect, its head was at least two feet above the ground.

The complete success of this experiment seems assured and the happy result leads us to hope with confidence that a family of young emus may become a yearly feature of the Zoological Park.

Preparing for Hot Weather.—The shedding of our big Alaskan bears the present summer was so pronounced that the animals were almost devoid of hair. This was particularly marked with Ivan, the largest bear in the collection, who weighs more than a thousand pounds. Ivan's mighty bulk has been a source of amazement to visitors, but the complete shedding of the long and shaggy winter hair from his massive frame caused a surprise to us all. He appeared to be fully a third smaller than during the cold months.



PART OF THE AXIS DEER HERD
Ten specimens of these beautiful deer are offered for sale.

AXIS DEER FOR SALE.

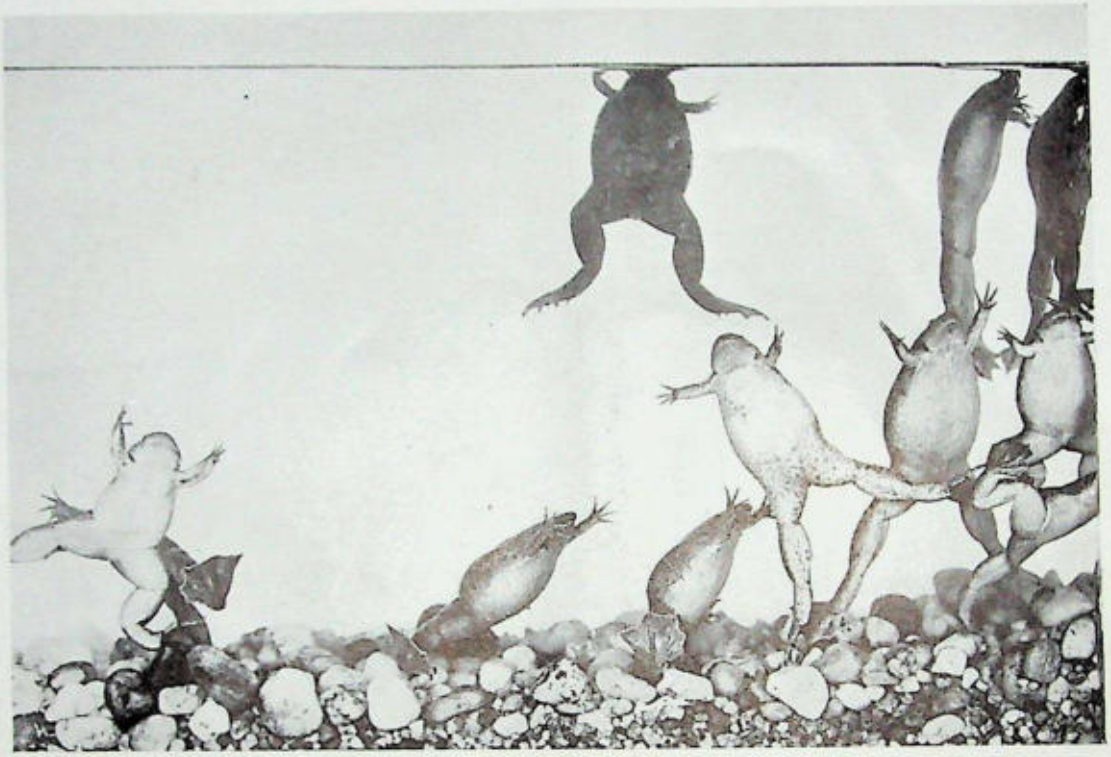
The Zoological Society offers for sale ten head of Axis Deer (*Cervus axis*), to reduce the size of the Park herd.

In the opinion of the undersigned, the Axis deer is the finest of all deer for American parks, either public or private, and there is no drawback to its maintenance that is at all serious. The axis is the handsomest of all deer, being beautifully spotted all the year round; and it is physically so sound and strong that (here) none ever die of disease. It is very prolific and 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.

Our Axis deer are always fat and in fine condition; and no one can resist their beauty. The only drawback in their keep, 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 centre of their barn a cheap base-burner stove, and about two tons 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. We have for sale pairs of various ages, at the following prices: one year old, $75 each animal; two years old, $100 each; three and four years old, $125 each; and orders will be booked in the order in which they are received.

W. T. H.



AFRICAN SWIMMING FROGS

These creatures never leave the water. They assume varied and ludicrous poses.

OUR COLLECTION OF SWIMMING FROGS.

THE frogs comprising the Superfamily *Aglossa*, or Tongueless Frogs, have been popularly called "swimming frogs," from their thoroughly aquatic habits. They live in permanent pools, in their tropical *habitat*, which they have never been observed to leave voluntarily. Three species of the genus *Xenopus*, belonging to this remarkable group are on exhibition in the Reptile House. The largest is known as the "Smooth Clawed Frog," (*Xenopus laevis*). It attains a length of body of four inches and has a smooth skin, except for several rows of thread-like filaments on the head and body. Its color is dull olive, with large variously-shaped spots on the back and limbs. The throat and abdomen are white, sometimes faintly spotted with brown. The head is comparatively small, flat, with small eyes, situated on top and looking upward. A star-shaped pattern of fine white filaments surrounds the eye. The mouth, which has teeth in the upper jaw only, is very wide. The three inner toes carry sharp, horny claws at their tips. The home of this frog is tropical Africa southward to Cape Town.

The second species is known as the "Tentacled Clawed Frog" (*Xenopus muellerii*), and inhabits East Africa. In general outline and proportions it resembles the species first described, but is smaller, rarely exceeding two inches in length. It has a short tentacle or "feeler" under each eye. The color of the back and limbs is muddy green without spots. Throat and abdomen are white. In addition to the three claws on the inner toes, this frog has a spur on the heel. The third species is called the Pigmy Clawed Frog, (*Xenopus calcaratus*). Its maximum length is slightly over an inch. West Africa is the *habitat*.

The two first described species were brought from Europe by Mr. Ditmars in the spring of 1909, and we rate them among the hardiest and most satisfactory amphibians exhibited in the Reptile House. They are thriving in a large aquarium with coarse gravel and planted with *Sagittaria*. Their food consists of small pieces of raw beef, given once a week and varied occasionally with small earthworms.

The smaller named species of *Xenopus* was brought from Africa by one of the late Carl Hagenbeck's collectors, and bids fair to rival its relatives in hardiness.

The swimming frogs are greedy feeders, snapping up the food as it slowly sinks or searching for it among the gravel, with curious shoveling motions of the forelimbs. They are very deft in the use of their "hands," picking up an insect or worm, transferring it to the mouth, and, if found too large to be swallowed immediately, manipulating and turning it until it is in proper position to be gulped down.

Very large earth-worms are torn with the aid of the claws, the frog violently kicking forward and holding the worm with the jaws and "hands" at the same time.

Visitors are often attracted to the aquaria containing these queer frogs by the grotesque attitudes assumed, as they float near the top with only the nostrils and eyes showing above the water, the body in perfectly straight position, giving them a strangely human aspect. At other times they will lie sprawled out on the gravel at the bottom with legs bent, and webs extended to their full breadth. All species of these frogs are exceedingly rare in American zoological collections. An accompanying photograph shows their grotesque posing.

RICHARD DECKERT.

THE BREEDING OF THE PENGUIN.

By LEE S. CRANDALL,
Assistant Curator of Birds.

PENGUINS, with their seal-like habits and unbird-like appearance, always arouse the interest of the casual observer. The wonderful motion pictures which have recently been exhibited, showing various species of penguins in their Antarctic homes, have given a great number of people at least a glimmering of knowledge concerning these strange birds. In the light of these facts, therefore, it is always a distinct shock to hear the oft-repeated opinions of visitors at the penguin pool, that the inmates are "young seals" or "some kind of duck."

Because of this strong interest of the public, it is our endeavor to keep penguins constantly on exhibition. Two factors have militated against us—the extreme scarcity of the birds and the difficulty, especially in hot weather, of keeping them, once obtained.

We had been without penguins since 1910, and so in March, 1914, were much pleased to be able to secure a single specimen of the Black-footed Penguin (*Spheniscus demersus*). This bird soon became acclimatized, and in July, five more were added. This flock was placed



BLACK-FOOTED PENGUIN
The young bird, after the immature plumage had been attained.

in the walrus pool, but soon showed evidence of distress from the heat. They were at once removed to the cool interior of the Aquatic Bird House, where they passed the summer, undergoing a thorough molt during this period.

As soon as cool weather appeared, the penguins were returned to the outdoor pool. They were now in much better physical condition, and the coming of frost found them in excellent spirits. Winter had no terrors for them, once they had learned to enter the low hut for protection from the deep snow, and they bathed daily in the icy water.

On rare occasions, black-footed penguins have been bred in Europe. Of continental institutions, the Jardin d'Acclimatation in Paris seems to have been the most successful. In 1906, two chicks were hatched in the Zoological Gardens of London, for the first time in England, and this success has since been repeated.

Early in the spring of 1915, two of our own birds began taking a decided interest in each other, and it became evident that our hopes of successfully breeding the penguin in America, were not without foundation.

On April 9, one of the birds was found closely guarding a chalky white egg, which had been deposited in a shallow hollow in the sawdust which floored the hut. Two days later a second egg appeared. From the first, the nest was guarded with the utmost devotion. The birds alternated in incubation, relieving each other at intervals, apparently without regularity.

At feeding time, the one off duty gulped a few pieces of fish, and quickly waddled into the hut to allow its faithful mate to go out to eat. Frequently the male regurgitated several large pieces of fish for the benefit of his mate, which ate them while remaining on the nest.

The nesting birds gave no evidence of quarrelsomeness, but for safety's sake it was deemed best to remove the remainder of the flock. Suitable quarters for the unmated birds were found in the shade of the Goose Aviary, which seems well suited to their needs. To protect the breeding pair from the sun, a large tarpaulin was rigged over the corner of the enclosure which includes the shelter. After some effort, a means was found for providing a steady flow of water in their tank, so that a cool bath was always available. These means have appeared perfectly adequate as a safeguard against our tropical heat.

On May 17, thirty-eight days after the first egg was laid, a tiny youngster, sparsely clad in grayish down, was found in the nest. Two or three days later, a second appeared, but it was never strong, and soon succumbed. The older bird was more vigorous, and throve from the first. In the early stages, it strongly resembled a young gull, except that it lacked the ability to move about so freely as that precocious nestling. It piped vigorously, with a shrill whining voice, but otherwise showed few signs of activity.

By the middle of June, the scraggly, baby down had been replaced by a dense, velvety second coat, and the bare spaces of the face were demarcated. It was now enormously fat, and about ten inches in length, but still unable or unwilling to stand upright. It moved from place to place on all fours, shuffling along with surprising speed, propelled by feet and stubby wings.

By the first of July, the young bird could stand erect. When disturbed, it assumed a curious, crouching attitude, arching its back and neck until the head nearly touched the ground, and moving it slowly from side to side as it gazed at the intruder.

All feeding of the young bird is done by regurgitation. At first, this was a quiet and gentle act, the parent, with lowered head, standing over the chick, which thrust its head and beak upward as far as possible into the chasm of the old bird's throat. Later, feeding time was the occasion for what seemed a rough and tumble fight.

There was much rivalry between the parents as to which should be the first to minister to the wants of the chick. The contest opened with a foot race. If one bird could win by sufficient margin, its reward was the privilege of a violent affair with the bulky youngster, which resulted in the emptying of the contents of the stomach of the old bird into that of its offspring.

On the other hand, if the race ended in a tie, a ludicrous wrestling match at once ensued. Each bird entwined its head and neck about that of its mate, pushing and shoving and indulging in all sorts of tricks and shifts in order to reach its goal, the gaping throat of the chick, which hovered constantly about its struggling parents. It was seldom that one bird could outdo the other fairly, but finally one would reach across the others back, and the head of the young bird would instantly disappear from sight in the throat of the victor. Once the defeated bird realized what was taking place, it at once ceased its efforts, and meekly stood aside until the exhaustion of its mate's supply of partly digested fish gave it an opportunity to disgorge likewise.

About July 20, when the bird was two months old, the chick down commenced to be replaced by feathers. The change was quickly completed, and by the first week of August the young penguin was completely clothed in the immature plumage of its species—a light bluish drab above, and white below.

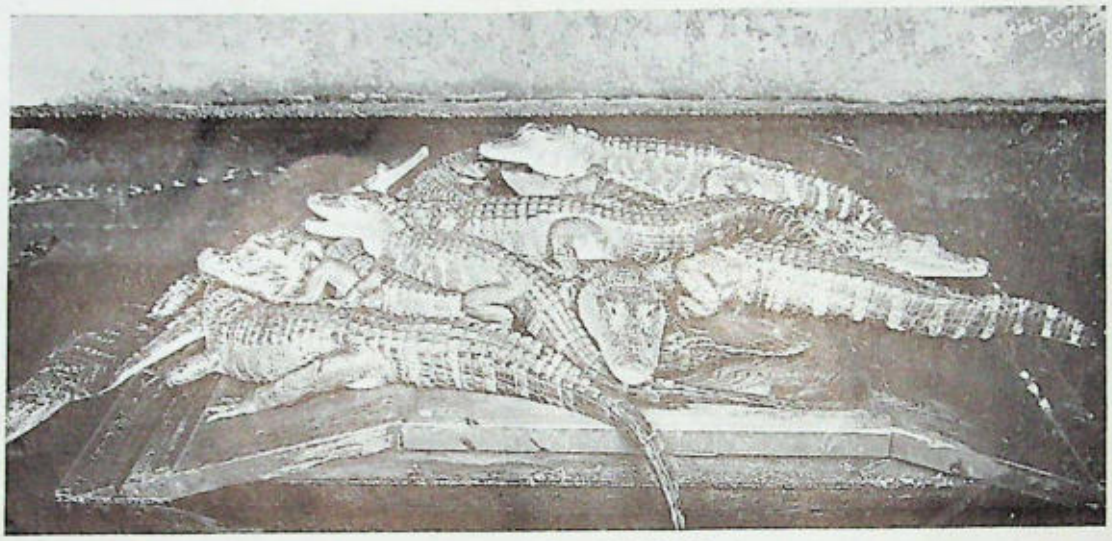
In the wild state, young penguins are said never to enter the water until the immature plumage has been attained. Strangely enough, our youngster was observed in the water with his parents, on July 25, when in the middle of his molt, and on the twenty-seventh he was diving freely.

Up to the present (August 20), although fully the equal of his parents in aquatic ability, the young bird has not learned to feed for himself, but for sustenance is still dependent on his parents.

THE CROCODILIANS' NURSERY.

ONE of the most striking groups exhibited in the Reptile House is the batch of small and half grown alligators, crocodiles and turtles, occupying the marine tank, situated at the eastern end of the turtle bank on the main floor.

These creatures often crawl, to the number of a dozen or more, upon the bench in the centre of the tank, and will lie there, basking, sprawled out over, under and alongside one another, with all outward signs of contentment and comfort. After they have settled down, they will usually remain motionless for hours, some of them in the most grotesque poses and seemingly strained positions, such as widely opened jaws, stiffly



A COLONY OF CROCODILIANS

Four species are to be seen. They are the Orinoco Crocodile, Central American Crocodile, Broad-nosed Crocodile of West Africa and the American Alligator.

outstretched limbs, or, in the case of the turtles, fully extended necks.

This exhibition always stimulates questions by visitors, as to whether the reptiles are alive, or only stuffed, some remarking on the "natural poses" of the supposedly mounted specimens. Inquisitive urchins will throw pebbles and other small objects at the reptiles, often actually striking an alligator or turtle, but the reptiles usually pay no attention to such trifles, and never even wink. Suddenly some visitor will lean over the rail farther than usual, when the spell is broken, and the whole assembly of crocodiles, turtles and alligators tumbles and scrambles pell-mell into the water, causing many exclamations of astonishment.

By the keepers the crocodilians in the collection of the Reptile House are divided into four groups, according to size. Every year numbers of baby alligators are brought by returning tourists, as souvenirs from Florida; but interest is soon lost in the queer "pets," and they are taken to the Reptile House at the Zoological Park, usually as a last resort to save their lives. The majority of the baby " 'gators" received thus are in poor physical condition, having been kept for weeks, perhaps months, in a starving condition. Naturally all attempts to make them eat sugar, bread, cake or candy end in failure. Of course the greater number of these victims to the souvenir-habit die soon after arrival at the Reptile House, but a few are successfully reared each year. Upon arrival at the Reptile House these young " 'gators" are placed in a cage in the lobby, where they have bottom heat from hot water pipes extending underneath the cages. A large shallow pan of tepid water is also provided. The temperature in this cage is never allowed to fall below 72 degrees Fahrenheit. Once a week the youngsters are fed on very small pieces of butterfish, which they soon learn to take from the forceps. This diet is varied occasionally with large earthworms. Once the baby alligator has started to eat, the chances of rearing him are in his favor.

When the infants have reached a size of eighteen inches or more, they are transferred to larger cages, provided with proportionately larger and deeper tanks. They are now fed with strips of butterfish, and thrive on this diet. Upon attaining a length of two feet or more, the young reptiles have grown too large for this second "nursery," and are again transferred, this time to the marine tank, where the water has a depth of eighteen inches, and is kept at a temperature of about 80 degrees Fahrenheit. The tank is about twelve feet long and eight feet wide.

RICHARD DECKERT.

Interesting Mammals.—The Small Mammal House has lately acquired several new and exceedingly interesting specimens. Among the arrivals is a rare flying squirrel from Australia, a young example of the African bush pig, a pair of echidnas and two very large African porcupines.

ZOOLOGICAL SOCIETY BULLETIN

Departments:

Mammals
W. T. Hornaday.

Birds
C. William Beebe.
Lee S. Crandall.

Aquarium
C. H. Townsend.
Raymond C. Osburn.

Reptiles
Raymond L. Ditmars.

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Elwin R. Sanborn,
Editor and Official Photographer

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SAMUEL THORNE,

Benefactor.

The President of the New York Zoological Society deeply regrets to announce the death of Mr. Samuel Thorne on Sunday, July 4, 1915, at Millbrook, New York.

Mr. Thorne was one of the early members of our Board, and had been a member of the Executive Committee since 1902, and Vice-President of the Society since 1909. He always was devoted to the interests of the Society, and contributed most generously to its general work, and particularly to the development of the Zoological Park.

THE BEAVER OF THE ADIRONDACKS.

The successful restoration of the beaver to the Adirondacks is a permanent memorial to the late Harry V. Radford, of New York, who was murdered by Eskimo hunters, about two years ago, on the shore of the Arctic Ocean.

The restored beavers have so completely possessed many portions of the Adirondack wilderness that to the owners of a few camps in that region, they have become a menace. In the cutting of trees *Castor canadensis* is no respecter of persons, and occasionally he commits the tactical error of cutting a one-hundred dollar shade tree in front of a ten-thousand dollar "camp" when a two-dollar tree in a spot of no esthetic value ought to be "just as good."

Last year certain gentlemen were so peeved by the activities of neighboring beavers that they even went to law about it, and at the end of the first round secured against the State a verdict of $1,900 for damages. The case has been appealed, by the State, and the end is not yet, and we opine that it may be difficult to prove so much damages from beaver causes.

It is natural for an Adirondack man to go around with a chip on his shoulder, daring any public beaver to knock it off. Naturally the Adirondack trappers would welcome an open season in Harry Radford's beavers; but we hope that no such season ever will be granted, in our day.

The way out of any *real* beaver difficulty that might arise is plain, and easy to follow. In our very excellent code of State game laws, Section No. 158 expressly provides that whenever wild birds or quadrupeds in any locality "become destructive to public or private property," the state conservation commissioner may issue to a state game warden, or even to a private individual, " a permit to take such species" and dispose of them as the commissioner may direct; and the permit shall expire three months after its date.

It is therefore desirable that all owners of property in the Adirondacks should know this law, and in times of beaver peril they should apply to Conservation Commissioner Pratt for the measure of relief that the law wisely affords.

The beaver was restored to the Adirondacks nine years ago, at the expense of the State, by the liberation of about 25 individuals. Now it is estimated that the number of beavers in the Adirondack wilderness is not far from 3,500.

W. T. H.

BIRD KILLING STOPPED IN THE DUTCH EAST INDIES.

All Species Save Three Protected by Rigid Embargo Act.

(From the New York Sun.)

Notwithstanding the horrors of war at her very doors and the burden of caring for 300,000 helpless Belgian refugees, Holland gallantly has gone to the rescue of the bird species of her East Indian possessions that were being killed and sold for millinery purposes. It appears that throughout the whole of her vast island empire in the Malay Archipelago, 3,000 miles long by 1,000 miles wide, all bird species save three are now absolutely protected against the feather trade, with a probability that eventually no exceptions will be made.

It was about two years ago, immediately following the great victory in the United States over the feather trade of the world, that Dr. Hornaday addressed a formal memorial to the Royal Zoological Society of Amsterdam, calling the attention of that powerful organization to the alarming exportations of skins of birds of paradise, crown pigeons and other species of birds from the Dutch East Indies. It was strongly urged that the Netherlands Government should be asked to protect its colonial bird fauna by prohibiting all exportations of skins and plumage save a few for educational purposes.

While the subject was not a new one to the Royal Zoological Society, the American victory gave opportunity for a new attack. Through the keen initiative of Dr. C. Kerbert, director of the Amsterdam Zoological Gardens, and Prof. Max Weber, a commission was immediately formed by the Royal society to start a new movement and to pursue it. A report upon conditions in the Dutch East Indies and also general assistance was sought of Dr. J. C. Koningsberger, the director of the botanical gardens at Buitenzorg, Java, who, in the interim, has journeyed to Holland and returned to Java.

During all the time intervening Dr. Kerbert has reported satisfactory progress and predicted important results. The director of the New York Zoological Park recently received from him the news that a sweeping and almost complete protective measure has been extended to the birds of the Dutch East Indies. The following is the text of the letter:

Amsterdam, July 12, 1915.

To William T. Hornaday, Esq., New York.

Dear Sir:

We are pleased to be able to inform you that the committee for the advancement of a prohibition of the export of birds and parts of birds from the Dutch colonies has received from the corresponding member of the committee, Dr. J. C. Koningsberger, director of "'s Lands Plantentuin" at Buitenzorg, Java, the following information about the shooting of birds of paradise:

1. This year (and probably also in future) the shooting is limited to these species: Paradisea minor, Seleucides nigricans and Ptilornis magnificus. The export of skins of all other species is prohibited by the Dutch Colonial Government, and these skins have therefore no commercial value.

2. Shooting is totally prohibited in the islands of the Radja Ampat group (Misole, Salawatti, Batanta and Waigou) and in those of the Geelvink Bay in New Guinea, as well as in two large reservations on New Guinea, on both sides of the Geelvink Bay.

By these means the protection of the rarer birds of paradise is obtained, and we have every hope that in future the shooting of all birds of paradise will be totally stopped.

Sincerely yours,

C. Kerbert, *Chairman.*

Lt. de Beaufort, *Secretary.*

In plain English, the three species not yet fully protected in all areas are the lesser bird of paradise, the twelve wired bird of paradise and the rifle bird. Inasmuch as bird protection never loses ground, and always gains in public favor, it is safe to predict that within a reasonable time all the birds of the Dutch East Indies will receive the complete protection that an embargo on exportations easily can afford.

In this connection is to be noted that on January 1, 1915, a law prohibiting the importation of wild birds' plumage for commercial purposes went into effect over the whole Dominion of Canada; and thus the prohibition now covers all North America north of Mexico.

PROTECTION FUND FOR WILD ANIMAL LIFE.

The permanent wild life protection fund, which W. T. Hornaday has been instrumental in collecting during the past two years, now amounts to more than $84,750. The income of this fund is to be used for conducting a nation-wide campaign during the next hundred years in behalf of wild life protection. Efforts will be made to stop the sale of wild game, promote laws to prevent unnaturalized aliens from owning or using rifles and shotguns, stop all spring and late winter shooting, stop all killing of insectivorous birds for food and of all birds for millinery purposes, increase the number of game preserves, etc. It is proposed to inaugurate next September, a campaign in favor of creating game sanctuaries in the national forests on a very comprehensive scale.—*Scientific American.*

SUCCESSFUL BIRD INSTALLATION.

That most captive birds are happier in large cages is a fact which has been amply demonstrated in the Zoological Park. A comparison of the condition of the small finches, weavers and waxbills in our large aviaries with that of birds kept in the usual small cages is convincing evidence. Some of these atoms have inhabited their present quarters for considerably more than five years, and still are in perfect health. The thrushes also are infinitely better in roomy cages, as they are inherently wild,



BREEDING BIRDS IN THE FLYING CAGE
White and Black-headed Ibises are seen on their nests.

and seldom become reconciled to close confinement. On the other hand, they soon become tame and confiding when they have room to fly about, and will keep in perfect condition for many years. In fact, with certain exceptions, all birds thrive in confinement in direct proportion to the amount of room they are allowed.

That there are exceptions to this rule comes as a surprise to many. There is no doubt, however, that there are many birds which, from one cause or another, do much better in small, individual cages. Here they can be provided with special food and care, which they are able to enjoy without disturbance by greedy or quarrelsome cage-mates, and they also are more easily protected from dangerous draughts. A few are quarrelsome as well as delicate, and cannot be associated with other birds.

In 1911, a series of ten cages, 42 x 28 x 20 inches, and 25 x 32 x 20 inches, was erected at the sides of the passage from the Parrot Hall to the Glass Court. Their complete success was so evident that early in 1913, sixteen more were added. At present, these cages house thirty-one birds of twenty-seven species, all in the most perfect condition, and many of them have been there since the erection of the first cages. All are of uncommon interest, and many are very rare. They include eight species of parrots and parrakeets, two of lories, a hoopoe, Burchell coucal, Cuban green woodpeckers, African roller, barbets, red-starts, flycatchers, kinglets, honey-eaters and others. All of these birds are physically delicate and temperamentally shy. A few, it must be confessed, are quarrelsome as well, and previous experience has shown the impracticability of keeping them with other birds. Thus these individual cages enable us to exhibit many species which could not be kept otherwise, and form in themselves one of the most attractive exhibits of the Large Bird-House.

L. S. C.

BREEDING RESULTS IN THE BIRD DEPARTMENT, 1913.

ALTHOUGH weather conditions during the spring and summer just past were uncommonly adverse, breeding activities among our birds have been equally unusual. A special effort was made this year to increase the number of young birds annually reared, and much credit is due the various keepers whose interest has made possible our success.

Most important, of course, at least from the popular point of view, are the young penguin and emu, mentioned elsewhere in this number of the BULLETIN. But what may prove to be of even greater interest, are the really remarkable attempts at reproduction, by the birds in the Flying Cage. Unfortunately, most of these efforts were abortive, but the mere fact of their nesting leads us to hope that another season may bring more satisfactory results. It is a pleasure even to be able to record that two pairs of snowy egrets built, laid and incubated, in company with a colony of white and black-headed ibises and roseate spoonbills. Two white ibises were successfully reared, and a young spoonbill—no doubt the first in captivity—was hatched. A terrific rain storm, however, which found the birds at a critical time, wrecked most of the nests, and so demoralized the colony that breeding was promptly suspended for the season.

Three pairs of laughing gulls nested in a labyrinth of rocks built around a large stump in the Flying Cage. But in spite of our precautions, the young which eventually appeared vanished within the maws of various herons and pelicans, which are always on the watch for such delicacies. As a last resort, a hedge of branches was erected about the rockery, permitting the passage of the gulls, but excluding the larger birds. Some of the gulls elected to try again, and the only youngster which so far has appeared, is now nearly half grown.

Twenty-one Canada geese, about one hundred mallards, nine wood ducks, five madarins and one white-eye, represent the full returns among the Anserine birds. Most of the mallards were reared at the Nursery, and will serve to rehabilitate our rather depleted flock.

The rearing of wood and manadrin has always offered us a problem. Our stock of breeding birds of these species was very low this year, and few eggs were laid. But our success with the ducklings was marked, and next year we expect to follow the same lines on a larger scale.

The white-eye, a small diving duck of the Old World, has not previously been reared in this country. It is also the first diver to be bred in the Zoological Park.

The annual brood of the cereopsis geese, duly hatched in the Crane's Paddock, was destroyed by a particularly vicious raccoon. The wild raccoons which abound in the vicinity of the Zoological Park are actually a menace to the birds of the collection, and in spite of constant trapping, their yearly toll is considerable.

Our flock of Canada geese now numbers over seventy, and it will be necessary this fall to dispose of a portion of them.

Of Gallinaceous birds, we have reared two silver, one swinhoe, three goldens and one white-crested. A pair of California quail have three full-grown chicks, and a late brood of eastern bob-whites has just appeared, under the care of a bantam foster-mother.

We are particularly proud of our mourning doves. This is the only large dove now found in the East, and while its non-flocking habits have thus far saved it from the fate of the passenger pigeon, its very size makes certain its final reduction. It is therefore a great satisfaction that we have this season reared eight of these birds, two of them being at full liberty with the pair of turtle doves which hatched them. We now have fourteen breeding birds, which should form the nucleus of a valuable flock.

A pair of Australian crested doves, in the breeding cages, already have fully reared four lusty squabs, and are engaged in incubating a third pair of eggs.

Early in March, a downy youngster was found drowned in the drinking vessel of a large out-door cage occupied by a pair of Australian pectoral rails. The weather was of the worst, and we did not dare disturb the parents. Various delicacies were added to their menu, however, and it was not long before we were able to catch fleeting glimpses of a growing chick. This bird is now fully developed, and though extremely shy, is very strong and active.

Among the Passerine birds, the most interesting event was the rearing of a pair of hybrid wood swallows. The parents are a masked and a white-browed, both natives of Australia. The young birds are not yet in mature plumage, but appear to favor equally each parent.

Saffron finches have at least three babies flying about their aviary, and more are expected shortly.

As this is the first season in which we have made a really serious attempt at breeding, we feel greatly encouraged by the results. Much has been learned by experience, and we shall start next season better prepared for what may come.

L. S. C.

TRUMPETERS.

By C. William Beebe.

FAME and notoriety surround many birds and animals of the South American jungles in respect to excessive or unpleasing character of voice. After recalling the calibre and enthusiasm of these utterances one would be inclined to think that a totally deaf explorer would experience the greatest enjoyment in such regions. Macaws and parrots and steam-whistling frogs and the loco chachalacas possess no title to recall their vocal ability, but public feeling has forever stamped others with their remarkable success in this field. Among these are howling monkeys, screamers and trumpeters.

The veriest tourist can hardly have failed to hear macaws and howlers, but to know the voice of the trumpeter one must enter deeply into the lowland forest, and face the discomforts of bete rouge and the jungle dangers of falling nuts and fronds. Mentally and physically trumpeters are puzzles and their most inti-



WHITE-BACKED TRUMPETER

mate friends can gossip but little about their lives. Yet it is very easy to become their friend for they are among the tamest, most friendly of birds. If an Indian brings in a half-grown trumpeter or one slightly wounded, a few days suffice to show him the advantages of human companionship. He finds a supply of food, no enemies, chickens to boss and children to follow about, and these seem better than whatever he has been used to. Although full-winged and at the edge of the jungle, he elects to remain for the rest of his life. Demoralization sets in, however, for when a mate is found for him, he merely tolerates her and she reciprocates by showing desire neither for nest nor brooding. So while trumpeters can be bought for a little tobacco in every Indian village, yet their courtship, nesting, young and their habits in general remain a mystery.

We know their appearance well,—a humped carriage like a guinea-hen, and standing about twenty inches high. The head and neck, and most of the body plumage are velvety black with glints of wonderful iridescence on the breast. The wings are soft and not of great power, and the tail is negligible. The loose, hairy feathers of the lower part of the back form the chief badge of species. One kind has them white, another green and a third grey.

I recently brought green and white-backed birds from Parà, Brazil, together with a third little-known green form with very dark legs which is appropriately known as *obscura* and is found in only a tiny patch of country near the Amazon's mouth. The grey bird is the most common and the one I often observed in British Guiana. In that country they are called Warracabras by the Indians and are all tangled up in tradition with terribly fierce tigers which hunt in packs. The ordinary note of these birds is rather terrifying. It is a descending scale, subdued, muffled, inarticulate, but of great carrying power and suggestive of tremendous latent force. One expects every moment to hear the sound free itself of the muffled character and break forth in a great leonine roar.

As to habits, the trumpeters themselves would be amused if they could see what is accredited to them in scientific literature. They live singly or in pairs, or perhaps in flocks of three hundred! They dwell in the mountains or else in the lowlands; they roost on the ground or in the tree-tops. Reports of their nesting habits are quite as elastic, and if they don't scratch a depression in the ground they build high up in the foliage, or else in a hollow tree. They lay two eggs or seven or ten, and these are cream-colored, white, ashy or green according to the color-preference of the native who conveyed the information to the receptive scientist. It is really worth while, as a foil to the mass of facts which science claims as her *raison d'etre*, to quote one of the bravest of recent writers who dares to print "nothing can be positively asserted as to the habits of the trumpeters."



HUSKY TRUMPETER



FOLIAGE IN JEOPARDY
This youthful visitor demonstrates the public tendency to pluck branches that are close to the walks.

This mystery is all the more accentuated by the jolly friendliness of the little fellows. They become so interested at being photographed that the process becomes a test of patience, the only difficulty being to push the birds far enough away to get them in focus. Every other plate shows them rushing headlong upon the camera in whole-souled curiosity and friendliness. Even when we are so unkind as to shoot and dissect them we learn little of their affinities. They bear some resemblance to the cranes but are so individual and peculiar that they are usually placed in a family of their own. Their good fellowship extends to other small birds and their cages are peaceful and their life long in captivity.

ITEMS OF INTEREST.

South American Specimens.—South American specimens continue to arrive. The following were placed on exhibition during the last six weeks: gigantic grub of the hercules beetle, green scorpion, brown scorpion, giant centipede, several species of tree toads and ground toads, black and yellow tegu (a large lizard), *Amieva* lizards and the strange *Polychrus marmoratus*, a lizard belonging to the family *Iguanidae*, but developing along parallel lines with the African chameleons. In form the former would indicate a highly active reptile, but every movement is slow and deliberate, while the long tail is partly prehensile; markedly independent eye movements add to the chameleon-like aspect.

The Saki Monkey.—An important accession from South America has arrived in the form of a particularly fine specimen of Humboldt's Saki, (*Pithecia monachus*), a small monkey of such singular structure as to attract immediate attention. This animal shares the cage of the woolly monkey, (*Lagothrix lagotrica*), another strangely-clad creature of the American tropics. The saki is literally swathed in a luxuriant mantle of long, silky hair, which creates the deception of twice the animal's actual bulk. The tail is extremely long, but of such surprising bulk with its silky pelage as to appear of real disadvantage to the animal. Over the saki's head is a great pompadour of long, straight hair. The aspect of the creature's head is wild and tousled. Its eyes are small, green and apparently of impish cunning. At first sight this strange animal



THE FINAL RESULT
How one side of the tree is denuded by the breaking of branches.



HUMBOLDT'S SAKI
Rarely seen in captivity and remarkable for its long silky hair.

would appear able to endure considerable cold and exposure, but close examination shows the breast and abdomen to be devoid of the flowing pelage that covers other parts of the body. Our specimen came from Peru and was found at an elevation of 1,000 feet, on the eastern slopes of the Andes; but this does not imply that animals of the kind particularly frequent elevated situations. The woolly monkey, and other species of ordinary pelage occur to elevations of three thousand feet. A photograph of Humboldt's Saki is published in this number of the BULLETIN.

A Tame Iguana.—Among the South American exhibits is an iguana that is remarkably tame and intelligent, a combination not usually to be noted among the reptiles. This lizard persistently follows Keeper Palmer about the sandy yard, jumps upon his back and contentedly roosts on the man's shoulders. When Palmer enters the corral with a pan of food, this iguana is at once at his heels, demanding first choice from an assortment of chopped beef and beaten eggs, lettuce and bananas. It prefers to be fed from the keeper's fingers, and if the attention is not bestowed, appears quite at a loss to understand the inattention. Keeper Palmer reared the specimen from an emaciated and miserable arrival that had starved for weeks on its journey from Venezuela.

New Amphibians.—The collection of amphibians has been further strengthened by representatives of species not previously exhibited in the Reptile House. Several fine specimens of Drayton's Frog, (*Rana draytoni*), recently arrived from southern California. They are as large as a fair-sized eastern bull frog, of a rich chocolate brown above, while the underside is pale pink, which hue fuses into rich scarlet beneath the thighs. Another accession is a batch of Indian toads (*Bufo malanostictus*). They are rather smooth-skinned and possess a curious, crown-like protuberance on the head. From Brazil we have a large tree toad, known technically as *Hyla venulosa*, which has a very coarse skin and evinces the peculiar characteristic when annoyed, of exuding a foamy fluid from skin glands. In an adjoining cage is a noisy batch of the gray tree toad, found locally, and recently collected at night by our keepers when the toads were loudly chattering during continued warm and damp weather. Rarest among the new amphibians, is a specimen of the Snapping Salamander (*Gyrinophilus porphyriticus*), from the Catskill mountains. Beyond its custom, unusual for a salamander, of angrily snapping when annoyed, its habits are practically unknown.

Solving a Mystery.—For a week or more the keepers in the Reptile House were puzzled by an occasional whistle that appeared to come from an open window at the southeast corner of the building. The men decided that one of their number was endeavoring to perpetrate a joke. Every member of the reptile house staff had gone to that window, not once, but many times, to fathom the mystery. At first the keepers thought that visitors desired to ask when the building would be opened, as the whistle usually came a few minutes before nine, the time for unlocking the main doors. The solution came one morning when Keepers Toomey and Deckert were spraying some small amphibian cases that had been temporarily left on the window casing. Most of these contained salamanders hidden in sphagnum moss and all of them absolutely voiceless creatures. The uncanny whistle was heard to issue from one of the small cases. Digging up the moss, the men found a single specimen of the narrow-mouth frog, from Trinidad. In size it was not larger than one's finger nail. It was placed in a jar in another part of the building and next morning demonstrated how it had been the cause of so much investigation. The morning spraying of the plants

had excited the tiny creature to "sing." As the habits and songs of these tropical amphibians are little known, we added an interesting note to our observations.

Incubating Snakes' Eggs.—An exceptionally large number of snake eggs have been laid by specimens in the reptile house during the latter part of June and throughout July. Placed in damp sphagnum moss, at ordinary out-door temperature, the eggs of the greater number of species hatch in about eight weeks' time. Snake eggs are soft and leathery. They rapidly absorb moisture and steadily increase in size. Some are of oval form, while others are much elongated, really cylindrical in outline. They are snowy white or very pale yellow. Most of them have a smooth, satiny shell, but those of the common black-snake and the southern gopher snake, have the shell peppered with granules and look as if they had been rolled in coarse salt. The little snakes make their escape by slitting the soft shell with an "egg tooth" which is in the form of a sharp spine on the snout. This is shed shortly after the reptile hatches. A slight majority of the snakes lay eggs. The other species produce the young alive. In both instances the young serpent is ready to go in search of food as soon as it is hatched or born, and receives absolutely no attention from the parent.

Wild Animals near New York.—Despite the rapidly increasing size of New York City, its congestion and obliteration of everything that is green except the parks, one does not have to go far from the city to observe wild life. Local collectors and those members of our staff who go out on hunting trips in search of exhibition specimens, bring us many interesting notes. The following points of information came to us during July, from altogether authentic sources and in some cases substantiated with the specimens: About a dozen large opossums were captured in the northern portion of Bronx Borough; several fine raccoons were trapped in Bronx and Pelham Bay Parks; gray foxes are commonly seen within the town limits of New Rochelle and a litter of three came to us from that vicinity; several white-tailed deer have been repeatedly seen in the Eastchester section, within the city line; large blacksnakes are run over by automobiles on Pelham Parkway within the city line, and from barely ten miles north of the city line we have received several poisonous copperhead snakes and a large rattlesnake.

Escape of a Beaver.—While noting wild animals near New York it is appropriate to mention a non-resident that escaped from the Zoological Park. This was a large Canadian beaver with broad and paddle-like tail and lustrous pelage. It was a fine specimen, weighing about thirty-five pounds. As this beaver had lost a leg in a trap, we trusted him to occupy a cage without a top and here he lived contentedly for a week when he managed to climb out. Knowing the animal's fondness for cutting down small trees near water, we anticipated this beaver would soon disclose his whereabouts by starting to build a house of sticks or a dam along water courses in the Zoological Park. We were shortly much chagrined to discover that he was dissatisfied with our park conditions and had migrated to the Botanical Gardens, where trees and shrubs have definite ancestral history and value.

We were convinced of the beaver's visit to Dr. Britton's domain, by the description of a visitor, who excitedly told us that "a sea-lion has just crossed Pelham Parkway, going north! Its tail had been run over by an automobile and all flattened out!"

This was a rather illiterate, but perfectly plain description of the beaver, and we watched for signs of damage in the Botanical Gardens. The animal apparently went on a thorough tour of investigation, hiding in culverts during the day, and seeking a place of residence at night. He finally settled in a small, decorative pond, and started his engineering work. This definitely located him, and we investigated his would-be home. In one night he had gnawed off and brought down two long shoots of a maple. One of these was about twelve feet in length, and he had dragged it half way into a culvert draining the pond. From a clump of red maples, he had gnawed the bark from three trunks.

We built a cage over the culvert, with a door working from a trigger. To the trigger we fastened a bundle of birch. The trap was satisfactory in operation, and we drove up next morning and removed it to the Park—with the beaver in it. Despite the fact that he has but one forelimb, he now occupies a covered cage.

Tigers that Bathe.—Our Siberian tigers, despite their adaptation for a cold country, appear to suffer little from the heat. It is not a common thing to see cat animals bathe, but these majestic creatures enter their large bathing tank, lie in the water with only the head protruding, and remain so for an hour or more. They are extremely agile for animals of their bulk, and their leaps and gambols are in strong contrast to the dignified mien of the Bengal tigers in an adjoining cage.



INTERESTING ELK TWINS
Their appearance established the first record of twins in the elk herd.

The Long and the Short.—An interesting study of the heights of hoofed animals, may be noted at the southwest corner of the Park. Here, in adjoining yards near the Camel House, is a towering Bactrian Camel and a female Gudha or dwarf donkey mare (aged five years) and standing 29½ inches at the withers. The contrast in size of these two "beasts of burden" is startling and ludicrous.

A Savage Rat.—Like a man-eating tiger, which is alleged to be a criminal among the jungle beasts, the Reptile House has been visited by a flesh-eating rat. It attacked the inmates of various enclosures, but did particular harm among the turtles. The toll was one turtle each night and for a number of days a mutilated specimen would be found each morning as the keepers made their inspection. This sly animal evaded various trapping devices, and we at last resorted to poison. Two nights after the poisoned bait was set the mischief ceased. We were at one time troubled with a similar rat in the Monkey House which attacked the marmosets and squirrel monkeys and other smaller animals.

Elk Twins.—For the first time in the records of the Zoological Park, an American elk has given birth to twins. The mother is young, and has bred but once previously. The young animals are perfectly sound, and the mother appears in no way excited about caring for both.

Interesting Rodents.—The following recent accessions have strengthened our collection of small rodents: western pouched gopher, Gila chipmunk, California chipmunk, Mexican spermophile and a specimen of the Brazilian hare.

R. L. D.

THE GREAT-BILLED RAVEN.

As the boat-billed heron is to the night heron, or the shoe-bill to the stork, so is the great-billed raven to its brother of more normal appearance. A great, ungainly bird at best, the huge, bulging beak completes an ensemble which is more than grotesque. All ravens are interesting for their extreme sagacity and trickiness, both at liberty and in the aviary, but in point of unique physical characters, the great-billed occupies the highest pinnacle of raven development.

There are two forms of the great-billed raven. The Abyssinian (*Corvultur crassirostris*), is found in northeastern Africa, while the white-necked (*Corvultur albicollis*), occupies the southeastern portion. Both are brownish-black in color, with white nape, and the southern bird is further embellished with a white pectoral band.

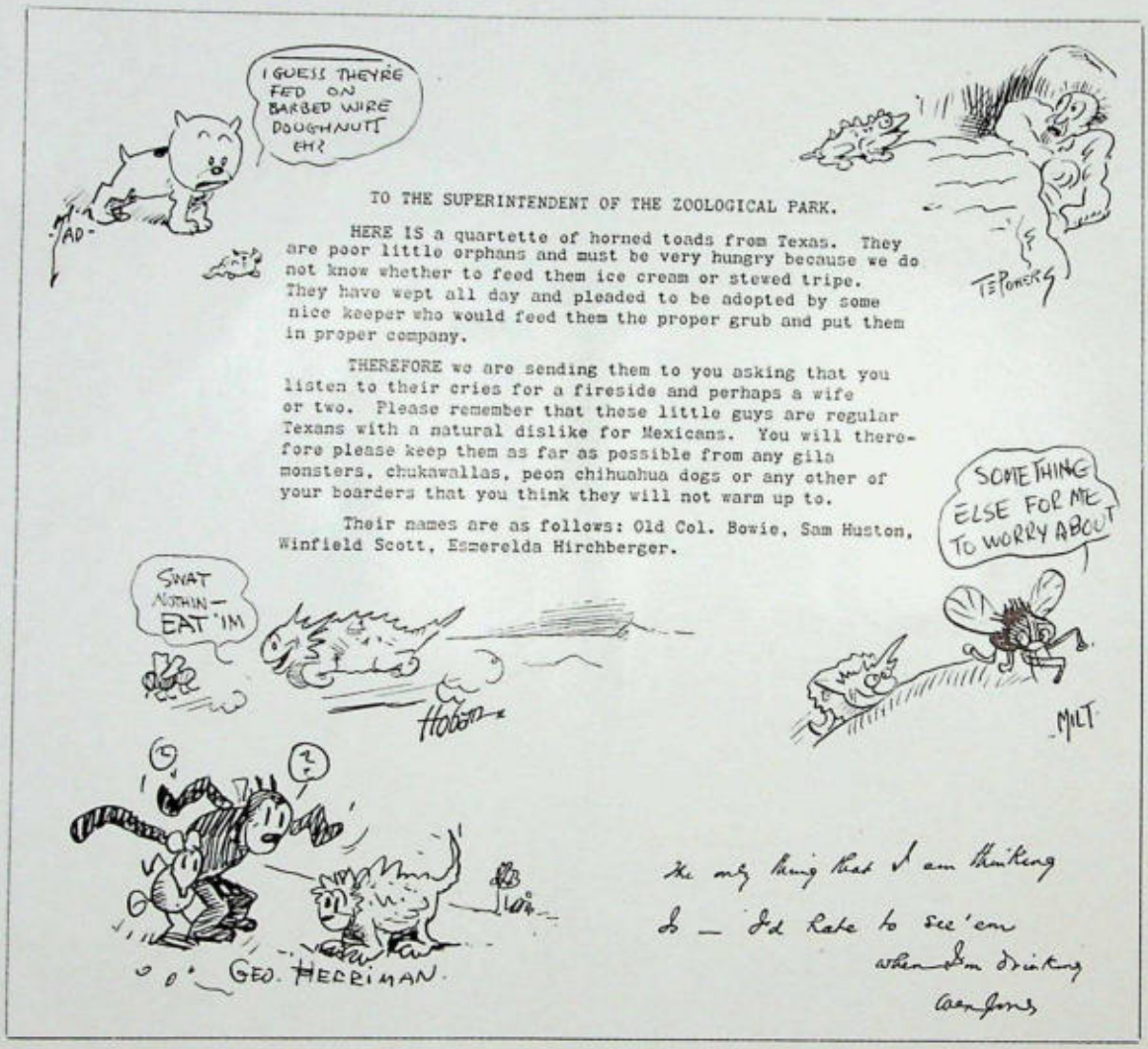
These birds are abundant in open country throughout their range, keeping much in the company of herds of domestic animals. They are very proficient as extractors of ticks from the hides of cattle and horses, and are not averse to attacking newly-born or weakly lambs. Carrion of all sorts, however, forms their chief food, and their keen intelligence usually enables them to discover carcasses in advance of the numerous other ravens and vultures which are their fellow scavengers.

Dead fish and crustaceans are eaten with relish, and even insects, in time of need, are not despised. When not disturbed, they are bold and fearless birds, haunting the vicinity of farms and even villages, in search of any chance bits of carrion.

Great-billed ravens are often kept as pets by the natives, and just why they should be so very rare in collections is not quite clear, but the fact remains that captive specimens are most uncommon. A pair of birds of the northern form, observed by the writer in the Zoological Gardens of London, in 1912, were the only examples on exhibition in Europe at that time, and there is no reason to believe that their importation has measurably increased since that date.

The specimen now in our own collection, a fine male, of the Abyssinian species, was received from the Hagenbecks in June, 1914. It occupies one of the large outdoor cages at the Aquatic Bird House, and having passed the winter without apparent discomfort, is now in the best of health and spirits.

L. S. C.



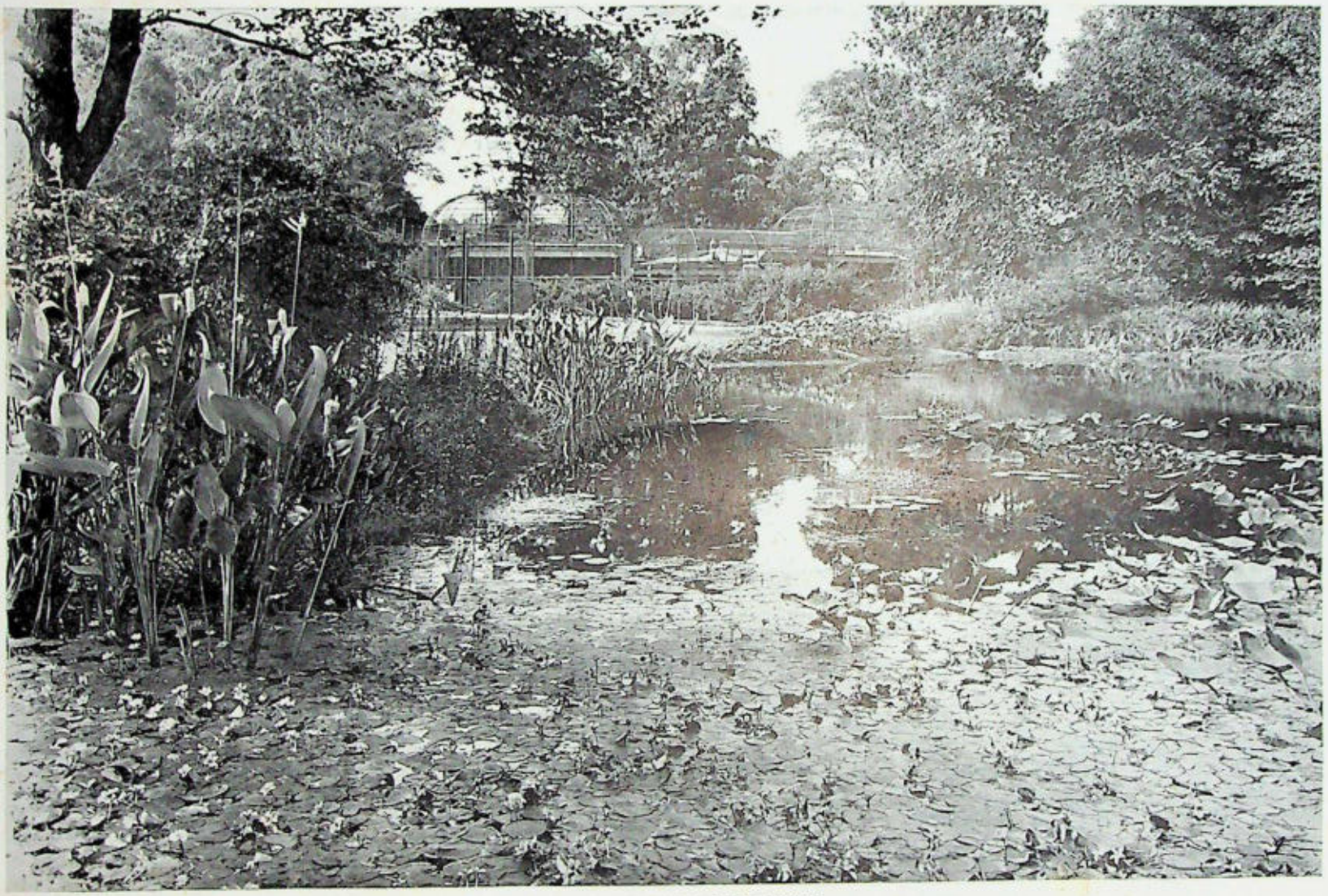
A GIFT FROM THE ARTISTS OF THE "NEW YORK JOURNAL", AND THE LETTER OF TRANSMITTAL

SNAKE HUNTING WITH AN AUTO.

The Curator of Reptiles has returned from a pathfinding trip to Ulster and Sullivan Counties. The country investigated is rich with ledges that are generously inhabited by rattlesnakes and copperhead snakes. In the past we have found it necessary to drive by horse or go on foot on our collecting trips for local reptiles. The new state roads, however, will render collecting a quick and simple process. A fine and quite wide cement state road now extends from Kingston, slopes and encircles the great Ashokan reservoir, thence extends as smooth macadam into the heart of the Catskills. A quite new state road extends from Newburgh, crosses Sullivan County, and ends at Cochecton on the Delaware. These roads lead through a country of many conditions, embracing river-valleys, lakes, swamps, foot-hills and mountains. Along them may be found every species of reptile inhabiting the state of New York, and the greater number of amphibians, as well.

In the prospecting trip to study the course of these roadways, a series of nearly fifty reptiles of eight species was collected in two days' time.

Rattlesnakes are particularly numerous, but despite their generous occurrence in Sullivan County, not a record of a snake bite was recorded. The result of the Curator's trip will render it possible to maintain our local collection of reptiles and amphibians by one or two short trips with an automobile each summer over the area described. R. L. D.



SCENE ACROSS THE MARSH GARDEN

The Eagles' and Vultures' Aviaries are seen in the background.

ZOOLOGICAL SOCIETY BULLETIN

AQUARIUM NUMBER.

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A HAPPY FAMILY OF FISHES

There are now twenty-five species in the tank.

From a photograph by Elwin R. Sanborn

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THE POWER OF THE SHARK-SUCKER'S DISK

By C. H. TOWNSEND.

THE shark suckers or Remoras are fishes well known for their habit of accompanying sharks, to which they cling by means of a broad sucking disk which covers the entire top of the head. They also attach themselves to sea turtles, porpoises, large oceanic fishes and even to the hulls of vessels.

The largest shark sucker in the New York Aquarium, (*Echeneis naucrates*) is thirty-two and one-half inches long and has a sucking disk seven inches long and three inches wide. The head disk in such fishes is capable of taking a marvelously tight hold of any smooth surface it may attach to.

While the writer was naturalist of the United States Fisheries Steamer *Albatross*, we caught many of these fishes, nearly all sharks hauled on board being accompanied by one or more of them. When such fishes were thrown into tubs or pails of sea-water to await further examination, they at once took hold of the vessel and could not be detached without the use of considerable force. On board the *Albatross* I have frequently taken a shark sucker by the tail and lifted it with the bucket containing more or less water, without making the fish loosen its hold.

In order to test the power of attachment of which the cephalic disk is capable, I recently made experiments with shark suckers in the Aquarium.

The first specimen tested was two feet long. A stout cord was tied around the tail and the fish dropped into a four-gallon galvanized pail half filled with water. Lifting steadily on the cord, I raised the pail and water without the fish's grip giving way an inch. The pail and water weighed twenty-one pounds.

The second specimen was twenty-six and one-half inches long, and its cephalic disk five and one-half inches. Lifting the fish by the tail, the bucket with more water added, was raised entirely clear of the ground, some of the water spilling out. The bucket and remaining water weighed twenty-four and one-quarter pounds. Had a deeper bucket been used, the fish might have lifted a greater weight, but the specimens were valuable and severer tests were not attempted.

Mr. Mowbray of the Aquarium staff, suggests that with such weights of water as we used in our tests, the fish *cannot* relax the grasp of its disk, and that greater weights would only tear the fish apart at some point. He once mutilated and killed a shark-sucker in trying to forcibly detach it from the bottom of a boat into which it had been thrown.

In several of the published descriptions of the shark-sucker, reference is made to the account given by Columbus, who said it was used by natives for the capture of turtles and fishes. With a line attached to its tail, it was liberated from the canoe near the turtle to be captured. Its hold was always tight enough to permit of the sea turtle being hauled within reach.

The account seems to be straightforward enough, but considerable research has failed to bring to light any corroboration of it, as concerns American waters. So far as can be ascertained the natives of Cuba make no use of shark-suckers in fishing and have no knowledge of its use in the past.

But we do not have to depend wholly on the narrative of Columbus. In the Proceedings of the London Zoological Society for 1884, Mr.



C. H. T. photo

SHARK-SUCKER

Lifting a pail of water weighing 24 pounds.

Holmwood, British Consul at Zanzibar, published an account of fishing with the shark-sucker as practiced by African natives, the method being the same as that described by Columbus. I have heard that Chinese fishermen at Singapore, also employ the shark-sucker in fishing.

It has been said that these fishes are used for fishing purposes in Japan, but so far as the literature on this region has been examined the statement is not corroborated.

By way of testing its fish-catching capacity, a shark-sucker sixteen inches long was liberated in one of the tanks of the Aquarium containing fishes. It took hold at once, and by hauling on the cord fastened to its tail a good sized grouper was brought to the surface of the water, although it could not be lifted out of the tank. When the fish began to struggle the shark-sucker let go. When tried on a fifteen-pound sea turtle, the latter could easily be drawn to the surface.

There can be no doubt that with a line attached to a large remora, a much larger sea turtle could be hauled in without difficulty.

Shark-suckers of several species are common in summer along our coast and specimens are usually to be seen at the Aquarium. It is not unusual for them to live a year or more in captivity.

Shark-suckers often attach themselves to the glass fronts or concrete walls of the exhibition tanks. When resting upon the bottom they lie either in the natural position with the dorsal surface uppermost, or turn over and attach the cephalic disk to the floor of the tank.

The inherent tendency of the fish to attach itself to something is very strong.

Its name *Echeneis*, meaning ship-holder, is an ancient one, the peculiar habits of the fish giving rise to the myth that ships were retarded by it.

This species (*Echeneis naucrates*) has, like many other marine fishes living in the Aquarium, the power of making instantaneous changes in its markings. The white stripes along the sides often disappear for a few minutes.

Tarpon from New York Bay.—During the summer the Aquarium exhibited two living tarpons about four and a half feet in length, which were captured in pound nets at Belford, N. J., in the lower part of New York Bay. Both specimens were injured in capture and lived less than two weeks.

It is not uncommon for the tarpon to wander northward late in the summer and stragglers are taken in pound nets in Long Island and Massachusetts waters nearly every year.



C. H. T. photo

SHARK SUCKER (*Echeneis naucrates*)

Showing disk on top of head.



C. H. T. photo

SHARK-SUCKER
Lifting a pail of water weighing 21 pounds.

SCIENCE AND THE DOMESTICATION OF FISHES.

By SERGIUS MORGULIS, PH. D.

A very extensive plan has been worked out by the Government for the domestication of food fishes, and the rivers and ponds of the country are stocked with millions of fish reared yearly in hatcheries. Numerous private concerns also derive profits from raising fish for the market. The full utilization of the water resources of the country, for propagating and rearing fish by artificial methods is something which must come in the future. There is no reason for doubting that some day each farmer will raise fish just as he raises fowls today.

The part played by science in the development of various industries is too obvious to require any comment. Agriculture and pure science have become inseparable as is evidenced by the large number of research institutions and experiment stations organized to promote its special interests. The appreciation of the need of applying modern, scientific methods to the study of various aspects of fish life is also awakening. Above all, from the practical standpoint, it is necessary to obtain scientifically qualified knowledge of the dynamics of fish life, of their functions and energy transformation, since the complete success of the future domestication of fish will rest upon this.

The task of investigating physiologically and biochemically aquatic organisms is a particularly difficult one, owing to the nature of their environment. It is not surprising, therefore, that in its first stages this study should be embarrassed by erroneous observations and faulty deductions. Even very recently some biologists of renown believed that aquatic animals derive all, or at any rate, part of their nourishment from substances dissolved in the water. It would take us far afield to discuss at length this hypothesis, but it will suffice to say that much careful analytical work was required to definitely dispose of this erroneous conception of the nutrition of fish.

Considering the organism merely as a machine, it depends upon the consumption of raw-material food for energy to perform work, such as locomotion, search for nourishment, etc., and to maintain its vital functions, such as the pulsation of the heart, respiration, digestion, secretion and so on. Besides, the organism requires energy for its growth and propagation.

The food materials of which all living organisms partake are of three prinepal kinds: proteins, carbohydrates and fats. In a general way the first are distinguished by the fact that their elementary composition includes nitrogen. Meat and white of egg are typical representatives of this group of food stuffs. Carbohydrates (sugar, starch) and fats contain the elements carbon, hydrogen and oxygen, the former being particularly rich in oxygen and the latter in hydrogen. As the amount of energy yielded by the combustion of hydrogen, weight for weight, is greater than that of carbon, the energy value of fat is the higher. Food, when it is digested, becomes absorbed and incorporated in the organism where it sooner or later undergoes oxidation or combustion, thereby setting its potential energy free, usually in the form of heat. This is then transferred into other forms of energy or work according to circumstances. The digestion, absorption and oxidation of the food are very complex phenomena. Much of these phenomena is still beyond our ken.

The final products contained in the urinary excretions as well as in the gases given off in breathing have been thus far very little investigated in the case of fish, though they have been

Note—At the request of the U. S. Bureau of Fisheries, laboratory space in the New York Aquarium has been furnished to Dr. Sergius Morgulis who is engaged in studies of nutrition in fishes, under the auspices of the Bureau. The work has been going on for several months.—*Director of the Aquarium.*

extensively studied in all other domestic animals. The decomposition of protein in the organism is followed by studying the nitrogenous content of the excreta, while the destruction of carbohydrates and fats, which on combustion yield water and carbonic acid, is appraised through knowledge of the respiratory exchange of gases. It is very important for the fish culturist to understand the phenomena which underlie the utilization of foods in the body. The utilization of food in the higher animal organisms has been exhaustively studied by students of dieteties. This problem is equally vital with regard to fishes.

It was my privilege to be entrusted by the United States Bureau of Fisheries with the study of the nutrition of fish. The experiments are partially conducted in the New York Aquarium. The laboratory facilities there for scientific research in this line are unfortunately very inadequate, but I wish to acknowledge my gratification to the Director and employees of the Aquarium who have helped me greatly in the work.

The procedure which I follow in my investigation is essentially the same as that employed in nutrition researches on man or other domestic animals. The different conditions of existence of my experimental animals necessitated, of course, different methods. This much may be stated: by analyzing the food of every feeding and the foecal and urinary excreta following each feeding, a careful comparison of intake and outgo is made possible. One is thus enabled to draw up a balance sheet which, at a glance enables one to determine whether or not a particular food, or food prepared in a particular way, is well utilized by the fish. The utilization of each constituent part of the food can thus be expressed in percents and standard conditions thus may be worked out, a deviation from which would unmistakably indicate the relative efficiency of the organism or the relative nutritional value of the foods. Thus the brook trout does not utilize cooked food as well as uncooked, while a fast even of short duration impairs seriously its capacity for utilizing food, especially fats. From the balance sheet of intake and output it is futhermore possible to discover exactly how much of each element the organism has added to or lost from its bodily reserves. We can tell whether it grows at a normal rate, putting on flesh and fat and can regulate the conditions to obtain the best results.

Domestication invariably means the substitution of artificial contrivances for natural conditions. Science, determining the facts with the aid of objective and careful methods, furnishes the fundamental principles in the adjustment of means to particular ends. The two must progress together.

A HAPPY FAMILY OF FISHES.

ONE of the lessons the Aquarium keepers have to learn is not to put different kinds of fishes in the same tank without considering the compatibilities. Fishes commit murder and indulge in cannibalism with alarming frequency. Their morals, like those of some other vertebrates, are no better than they should be. Fishes of the same species when kept in Aquarium tanks must usually be of about the same size or the very small ones may turn up missing.

Fish like to eat fish and generally do so when they get the chance.

When fishes of the same size fight among themselves it is necessary to sort out the chief aggressors and locate them elsewhere.

Experience teaches the keepers what combinations can be made without losses of specimens.

The Happy Family of fishes shown in the accompanying frontispiece has been slowly growing since the photo was made several months ago.

The tank now contains the following species which manage to get on together without serious quarrel:

Red Hind (*Epinephelus guttatus*), Rock Hind, (*Epinephelus adscencionis*), Black Grouper (*Myctoroperca bonaci*), Green Moray, (*Lycondontis funebris*), Spade-fish, (*Chaetodipterus faber*), Pork fish (*Anisotremus virginicus*), Dog Snapper (*Neomaenis jocu*), Spot Snapper (*Neomaenis synagris*), Gray Snapper (*Neomaenis griseus*), Schoolmaster (*Neomaenis apodus*), Mutton fish (*Neomaenis analis*), Crevalle (*Caranx hippos*), Yellow Mackerel (*Caranx crysos*), Neverbite (*Caranx rubra*), Blue striped Grunt (*Haemulon striatus*), Golden Grunt (*Haemulon melanurum*), Red Hogfish (*Lachnolaimus maximus*), Spanish hogfish (*Harpe rufa*), Blue Angelfish (*Angelichthys isabellita*), Black Angelfish (*Pomacanthus arcuatus*), French Angelfish (*Pomacanthus paru*), Squirrelfish (*Holocentris adscencionis*), Queen Triggerfish (*Balistes vetula*), Common Triggerfish (*Balistes carolinensis*), Blue Parrotfish (*Scarus coeruleus*), Chub (*Kyphosus sectatrix*).

C. H. T.



SPINY LOBSTERS, SQUIRREL FISHES AND STONE CRABS

From a photograph by Elwin R. Sanborn

HOPE FOR THE SEA OTTER.

THE sea otter (*Latax lutris*), an important marine fur-bearing animal of the North Pacific region, has during recent years been brought close to the point of extinction. It was fortunately included in "An Act to give effect to the convention between the Governments of the United States, Great Britain, Japan and Russia, for the preservation and protection of the fur seals and sea otter which frequent the waters of the North Pacific Ocean, concluded at Washington, July 7, 1911." The killing of sea otter is therefore prohibited until November 1, 1920. The species still exists in the Aleutian and Commander Islands, and in isolated spots to the southward, along the coasts of North America, and Asia, to Lower California and Northern Japan.

It is the most valuable of all fur-producing animals and is captured only by the most arduous hunting. While the catch has never been large, as compared with other fur-bearers, the value of the skin is great. Statistics relative to sea otter killing are limited to few sources and are difficult to obtain. The following figures relate to otters taken in the Aleutian and Kurile Islands, the very limited catch from more southerly regions not being available. The data collected by Captain Hooper, presumably from the records of the Alaska Commercial Co., places the total number of sea otter skins marketed from Alaska waters from 1873 to 1896 at 58,184.

More recently the catch of sea otters from the Kurile Islands stretching southward from Kamtschatka has been compiled from official Japanese records by Captain Snow of Yokohama, for many years engaged in sea otter hunting. His figures place the total number of skins marketed from 1872 to 1909 at 12,453.

During the period from 1873 to 1888 the catch of sea otters in Alaskan waters ranged from 1,000 to 4,000 annually. Since 1888 the catch has been limited to a few hundreds each year, although the efforts put forth by otter hunters were prosecuted as vigorously as ever.

In Asiatic waters (exclusive of the Commander Islands, where the otter has been partially protected) the catch ranged from 1,000 to 1,500 a year. Subsequent to 1879 the number of skins from the Kurile Islands marketed yearly has been only a few hundreds with the supply steadily decreasing.

The Russian authorities have long regulated the killing of sea otter, at the Commander Islands, and while conserving the supply of otters, have marketed many skins. The catch from the Commander Islands is not at the present writing available.

The catch of sea otter, along the coast of Vancouver Island was formerly so important that during the early days of British Columbia, the otter fishery was considered one of the most valuable resources of the province.

The treaty of 1911, to which the Powers controlling the coasts and islands included in the sea otters range are committed, should insure the safety of the existing scattered remnants. There is reason to hope that by the expiration of the treaty in 1920 the sea otter will have re-established itself.

C. H. T.

SEA LIONS AND THE FISHERMEN.

By C. H. TOWNSEND.

ON visiting the coast of British Columbia during the past summer, the Chairman of the Executive Committee, Mr. Madison Grant, learned that at the instigation of the salmon fishermen a government bounty had been placed on the Steller sea lion and that payments had already been made on 2,875 of these animals, when the bounty fund became exhausted. In addition to sea lions, bounties were paid on 2,987 hair seals. The total payments for 1914 and 1915 aggregated $14,329.50.

This is the usual procedure with fishermen who may be depended upon to attribute the depletion of fisheries to other causes than the wasteful fishing methods practiced by themselves.

Mr. Francis Kermode, Curator of the Provincial Museum at Victoria, already had appealed to the Provincial Government on behalf of the sea lions, with the result that a committee of the Biological Board was appointed to make inquiries regarding the charges made by the fishermen, the food habits of sea lions, the effects produced by the bounty and other matters connected with the subject; the fishery industries of the province being very important

Mr. Grant wrote to the members of this committee directing their attention to the dangers already surrounding wild life, the constant tendency toward its destruction, and urging the fullest possible inquiry in view of the prejudice against the sea lion.

He called the attention of the committee to the history of the campaign waged against the destruction of the sea lions by the fishery industries of California and Oregon some years



YELLOW-FINNED GROUPER (*MYCTEROPERCA VENENOSA*)
From a photograph by Elwin R. Sanborn.

before. In this case an inquiry concerning the food habits of sea lions was made by the United States Commission of Fisheries, with the result that the claims made by the fishermen were shown to be largely without foundation.

According to information received from the fisheries authorities of Canada, the report of the committee of the Biological Board is hoped for at an early date.

In this connection it may be well to discuss a little further the subject of sea lions and other seals in their relation to the fisheries and to point out the generally injurious effects of bounties paid for the destruction of animals presumed to be harmful.

The destruction of wild life is by no means limited to game animals taken for sport and food or to animals valuable for their skins, oil or other products. Sometimes a species that is not valued commercially, may be seriously threatened by men through mere ignorance or prejudice.

This is the case with the two species of sea lions inhabiting our west coast. From the fact that such animals at times eat fish, it occasionally becomes necessary to defend them against the attempts of fishermen and legislators to destroy them by wholesale methods. Many kinds of harmless birds and mammals have been the victims of bounties that eventually were shown to be both expensive to the taxpayer and injurious to the agriculturist.

About fifteen years ago, naturalists went to the rescue of the California sea lion which the fishery interests of the Pacific coast proposed to destroy by the thousands. It was asserted that there were 30,000 sea lions on the coast consuming salmon in large numbers.

An investigation by the federal authorities showed that there were probably less than 5,000 sea lions in that region and that their food consisted chiefly of squid and only to a moderate degree of fish and those of species of no great commercial value.

Sea lions sometimes get into fish traps and do damage to both fish and netting, but the charge that they were annihilating the salmon was easy to make and difficult to prove.

Before the advent of civilization on the Pacific Coast, both salmon and sea lions were

ZOOLOGICAL SOCIETY BULLETIN

Departments:

Mammals
W. T. Hornaday.

Aquarium
C. H. Townsend.

Birds
C. William Beebe.
Lee S. Crandall.

Reptiles
Raymond L. Ditmars.

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Elwin R. Sanborn,
Editor and Official Photographer

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abundant the salmon being numerous beyond all parallel during their annual runs into the rivers. Salmon became increasingly important commercially until the annual value of the fishery reached several million dollars. The fishing was exhaustive and the supply of salmon declined rapidly, but restrictive measures were long in coming and were never popular enough to be very effective. Man had disturbed the balance, but he placed the blame on the sea lions.

And so the sea lions were killed in considerable numbers by state authorities and fishermen until they became rather scarce about the mouths of certain salmon rivers. Permission to kill them on Government lighthouse reservations where they breed was fortunately refused by the Treasury Department. In June and July, 1899, the late Prof. L. L. Dyche, of the University of Kansas, examined the stomachs of twenty-two sea lions on the coast of California without finding any traces of fish. The food found consisted chiefly of squid.

He also found good fishing for rock cod within a few yards of long established rookeries inhabited by hundreds of sea lions which indicates that they do not feed to any great extent on rock cod.

The food habits of the fur seal are better known than those of the sea lion. The stomachs of 123 fur seals examined on the decks of sealing vessels in 1895 by C. H. Townsend showed that squid is the favorite food, that small oceanic fishes come next, while salmon and cod amount to very little.

The food of the elephant seal, so far as known, consists chiefly of squid or other cuttlefish.

Sea lions are found all along the west coast. The California sea lion extends from the Gulf of California to the southern end of Vancouver Island, while the Steller sea lion ranges from Central California to Bering Sea. Both species are common throughout most parts of their respective ranges.

They inhabit at some season of the year practically all of the smaller coastal islands and outlying rocks throughout their entire habitat. They are little disturbed by man as their commercial value does not warrant the labor of taking them. In some places they are of great interest to the public as at the seal rocks off San Francisco, Santa Catalina Island and other points along the coast.

The extermination of supposedly noxious wild animals by bounties is a measure that should never be adopted except in rare cases. The Pennsylvania bounty on hawks and owls was a disastrous example. Not only were useful birds destroyed in large numbers, but a great sum of money was wasted.

The bounties paid by western states on coyotes, not only proved expensive and led to fraud but created plagues of jack rabbits, that could only be kept down by expensive wholesale drives, when thousands would be killed in a single day.

The harbor seal, now comparatively rare along the North Atlantic coast, was destroyed through bounties at the instigation of fishermen, yet the animal is not specially harmful.

The extremely valuable fur seal has been saved to commerce only through the suppression of pelagic sealing by international treaty.

The West Indian seal (*Monachus tropicalis*) once abundant throughout the greater part of the West Indian region and valuable for its oil, is now approaching extinction, the survivors being restricted to a few small islets in the Gulf of Campeachy.

The Hawaiian seal, belonging to the same genus, and known only from small islands northwest of the Hawaiian group, has been reduced to small numbers, but may be saved as its habitat has been included in the Hawaiian Islands Reservation.

The northern elephant seal, once abundant, was killed in large numbers for its oil. It is now restricted to Guadalupe Island off Lower California, where probably not more than 100 still survive.

All the seals above referred to belong to the North American fauna.

Sea lions are still common, but we cannot view except with alarm, any wholesale slaughter of them for the sake of doubtful advantages to the fisheries.

FILTERING HARBOR WATER.

The greatest drawback to successful work in the New York Aquarium has always been the foul condition of the water pumped from the harbor.

Its low salinity, about half that of pure sea water, makes it bad enough for Aquarium purposes, but its pollution with sewage is a more serious feature.

The reservoir for stored sea water, built a few years ago, made it possible to keep all marine collections in the glass-fronted tanks, in good condition, but the occupants of the large floor pools could not be safeguarded in that way. These animals, seals, porpoises, sea turtles and fishes of large size have suffered on account of bad water, it being impossible to apply the stored-water system to these heavy feeding creatures.

Filters for the water of the harbor have always been needed but room in the crowded Aquarium building could not be found for them without sacrificing space devoted to exhibits. The difficulty has now been met by converting the elevated supply tanks into filters. This arrangement is a makeshift, as it lowers the "head" of water, but it is now possible to filter out practically all of the dirt held in suspension in the harbor water. The water is actually clear, but it is not expected that the filters will remove the disease carrying bacteria which it holds. Its salinity is of course as low as before. When as fine a specimen as the porpoise, which lived twenty-one months in the Aquarium, dies of sheer filth infection, it is one more sign that the building is not large enough to do the work demanded of it.

C. H. T.

REPORT OF THE STATE BUREAU OF FISH CULTURE.

The Annual Report of the State Fish Culturist for the year 1914, by Dr. Tarleton H. Bean, has recently been distributed and contains some interesting information.

The total number of fishes distributed during the year was 556,543,016 at a cost of $78.46 per million, including all expenses. The number of species propagated and distributed was thirty-nine, although some of these were used merely for exhibition purposes. The most important species numerically were shad, frost fish, white fish, lake herring, brown trout, rainbow trout, lake trout, brook trout, smelt, muscallunge, small-mouthed black bass, yellow perch, pike perch, and flat fishes, besides lobsters. The plan for stocking inland lakes with white fish and lake herring has been followed with success, and the lake trout is satisfactorily increasing in the larger lakes.

It is interesting to note that the policy of wintering small-mouthed black bass for spawners has almost entirely been given up, as adult fish approaching the spawning condition can be secured in outside waters in spring at much less expense.

Dr. Bean calls attention to the rapid decrease in the shad fishery in the Hudson as the result of pollution and obstruction. This reduced the output of the hatcheries handling this species. On the other hand, it is gratifying to note that the pike perch is rapidly increasing in stocked waters, and that white fish have been acclimated in the larger lakes of the state to such an extent that vast numbers of eggs for hatching may be secured from stocked waters.

Brief reports from the various hatcheries of the state are included as well as notes upon various species.

R. C. Osburn.

DR. R. C. OSBURN RESIGNS.

The Bulletin announces with regret the resignation of Dr. Raymond C. Osburn from the service of the Zoological Society, to accept the chair of Biology at the Connecticut College at New London.

Dr. Osburn has served as assistant director of the Aquarium since 1910, in connection with his duties as assistant professor of Zoology in Barnard College, Columbia University.

During this period he constantly made important contributions to the Bulletin, and prepared one of the pamphlets of the Aquarium Nature Series, entitled The Care of Home Aquaria, a very useful document.

Being a most accomplished zoologist, his assistance in handling the corespondence of the Aquarium and in dealing with the scientific aspects of the institution, has been very valuable to the Society.

Had the funds available for the maintenance of the Aquarium been as large as they should have been, the services of Dr. Osburn might have been retained permanently. He takes up his new work not only with the advantages of the experienced teacher, but the accomplishments of the trained zoologist. Connecticut College is to be congratulated on having secured his services as the head of its department of biology.



WHITE-FISH (*COREGONUS*) THREE YEARS OLD

From a photograph by Elwin R. Sanborn.

THE TUNA ON THE ATLANTIC COAST.

By RAYMOND C. OSBURN, PH. D.

IN the BULLETIN for November, 1910, notice was made of the occurrence of the tuna or tunny 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 occurrence have reached the Aquarium every summer since then.

To be sure, the tuna is an old resident on all the Atlantic coast, but he has been masquerading under such pseudonyms as Herring-hog, Horse-mackerel and the like, which are both uncomplimentary and misleading, since they are also applied to less aristocratic animals. The Cape Cod, Gloucester and Nova Scotia fishermen, from time immemorial, have been harpooning the big fellows occasionally when they had nothing else to do, or wanted a little practice with the "iron," or when there was nothing else in sight to eat. Misunderstood and unappreciated from every point of view, the greatest of all the modern bony fishes has serenely pursued his wonted course in the wake of the herring and menhaden shoals along our coasts, when he would have been perfectly justified in giving a contemptuous flip of his tail and heading for the Mediterranean. There he would receive a warm welcome from the whole race of Italian fishermen. There he would at least be eaten!

But the tuna's day is coming when he may reap the reward of his patient waiting. Thanks to the late Dr. Chas. F. Holder and his justly famous Tuna Club of Santa Catalina it became known a dozen years or so ago to the world at large that the tuna furnishes the greatest possible test of the angler's skill and endurance. As a result anglers from all the Atlantic States flocked to the California coast, all anxious for a try at the big fish in the hope that they might be able to land a hundred-pounder with the approved tackle and so have their names entered on the rolls of the Tuna Club.

All this time the tuna was ranging our own coast in large numbers, too proud to court attention, too conservative to advertise. However, the anglers have somehow awakened to the fact, long known to the ichthyologists, that the same species of tuna (*Thunnus thynnus, Linn.*), is found in all the great seas of moderate temperature and that his habits in the Atlantic do not differ from his behavior in Pacific waters. Everywhere he is the great tuna, the "leaping" tuna, surpassed in actual bulk among the bony fishes only by the ocean sun-fish or Mola, rivaling in speed and endurance any fish that swims, always hungry and ready to oblige an angler.

The waters about Nova Scotia have furnished the finest kind of sport for several years past, and the world's record for the capture of a tuna with rod and reel was made there at Port Medway on September 5, 1914. According to *Forest and Stream* (November, 1914, pp., 596-7), a tuna weighing 710 pounds, after the loss of much blood and measuring ten feet four inches in length and seven feet in girth, was taken by Mr. Laurie D. Mitchell, after a fight lasting eight and a quarter hours. The line used was 250 yards of single 39 line, attached to which was a double strand of seventy-five yards of No. 36 line and piano wire leader fifteen feet in length. This is so far ahead of all former records that it seems doubtful if it will ever be surpassed, though larger fish are taken every summer by other methods.

Along the New Jersey coast the anglers have not been quite so successful, though numerous smaller fish have been taken. The big ones are there, however, for a 1,080-pound tuna was harpooned at Wildwood, N. J., on July 27 of this year, according to the *Philadelphia Daily Ledger* for August 4, in which appears a photograph of the fish after its capture. This fish towed a dory with its crew for fifteen miles in three hours before a second harpoon could be thrown.

In the region about Block Island the tuna seems to be particularly abundant and for the past seven years has been taken in large numbers. Hundreds of sportsmen have there engaged these hardiest of all game fishes and with great success. A flourishing tuna club has been organized with permanent quarters on the island. Mr. Charles W. Willard of Westerly, R. I., commissioner of fisheries for that state, is president of the club.

In the Annual Report of the Rhode Island Commissioners of Inland Fisheries, January, 1914, Mr. Willard calls attention to the development of the tuna fishing industry at Block Island. According to this report, 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, as larger ones either break the lines or tear out the hooks and escape. Some idea of the abundance of the tuna in Block Island waters may be gained from the report of the deputy assigned to the task of collecting data on the fishery in 1913. "From the twenty-fifth day of July to the twentieth of October, 10,000 were caught by hook and line, averaging from fifteen to thirty pounds. In the same period,



A TAME PENGUIN
Probably *Spheniscus humboldti*

500 taken in traps weighed from 500 to 800 pounds, and taken with the sword-fish iron, 150 ran 400 to 900 pounds."

But it is not only in the realm of sport that the tuna is now attracting attention. He is beginning to cut a figure in commercial circles. It seems to be a law of humanity that what is cheap in price and plentiful in quantity is not good enough for the ordinary man. Thus horse-mackerel in 100-pound slabs given away or sold for a few cents a pound at most is very unattractive. But pack a 2-ounce portion in a can, label it TUNA in vermillion letters with a figure of a large glistening fish leaping out of a turquoise sea with picturesque foreign-looking shores in the background, and charge an altogether unreasonable price for it and it becomes a tidbit. So the humble horse-mackerel of the fishermen too poor to afford anything else has become under another name the *piece de resistance* of the fashionable luncheon. The tuna has at last got into society! Incidentally, a number of other large members of the mackerel family, poor-relation-like, are very apt to be found representing his lordship at the table, for a good deal of the canned tuna is said to be albacore, little tunny, etc. Perhaps, even the humble dog-fish may be utilized in this way, who knows? But these are all just as good eating as the tuna.

What will be the effect of the entry of commercial interests upon the angling situation is not yet evident, but probably it will interfere somewhat by reducing the number, as has so often happened with other species. However, this is scarcely a sufficient reason for interfering with the utilization of a good and ample food supply that heretofore has been chiefly wasted.

NEW MEMBERS

JULY 1, 1915—NOVEMBER 1, 1915

LIFE MEMBERS.

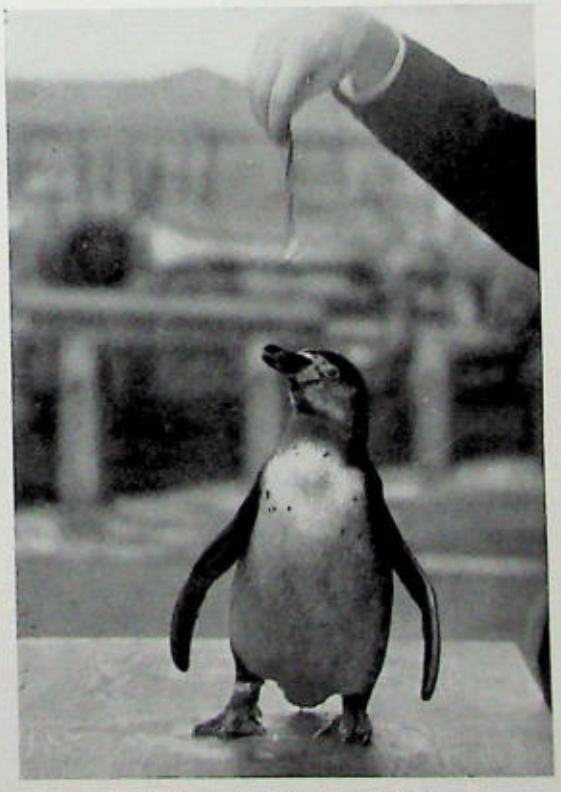
Binns, Walter,
Garner, R. L.,
Kinney, Morris,
Osburn, Dr. Raymond C.,

CORRESPONDING MEMBER.

Gillespie, T. H.

ANNUAL MEMBERS.

Bauer, R. M.,
Bryce, Miss Edith,
Cheney, Jr., Mrs. Knight D.,
Downer, J. Halsey,
Eberhart, Charles,
Ebel, M. C.,
Henderson, Norman
McBride, Mrs. Herbert,
Schumann, Jr., John J.,
Tucker, Mrs. Agnes J.,
Webb, J. Griswold,
Weinig, Bernard,
Williams, William H.,



THE PENGUIN IS VERY FRIENDLY



C. H. T. photo

A LARGE SPONGE FROM CUBA

ITEMS OF INTEREST.

Hawksbill Turtle.—A tortoise-shell or hawksbill turtle has been presented to the Aquarium by Mr. Emil Gottsleben of Nassau, Bahama Islands.

The specimen is of medium size with the top shell fifteen inches long and weighs fourteen pounds. This is the third hawksbill presented by Mr. Gottsleben. The species is quite valuable, furnishing the tortise-shell of commerce.

The Nurse Shark.—A young specimen of the Florida nurse shark, nearly four feet long, received in October, 1913, is still living in the Aquarium and has grown appreciably since that date. A large-sized adult which was brought to the Aquarium, lived only a few days. This is usually the fate of large specimens.

This species, notwithstanding its large size—sometimes ten feet in length, is entirely harmless to man. Its mouth is quite small and adapted only to gathering from the bottom the crustaceans on which it feeds.

A Tame Penguin.—It is not proposed to turn the Aquarium into an aviary, but when as interesting a sea bird as the penguin comes along, it is welcome to all the salt water diving space and sea food it wants.

The penguin, presented by Mr. W. O. Swatridge of Brooklyn, has proved a most attractive exhibit. Mr. Swatridge obtained it on the coast of Chili, and presented it to the Aquarium on July 12. It adapted itself to the new situation at once and gives every indication of enjoying life, swimming actively and feeding freely every day. A small raft in the sturgeon pool serves as a diving board and resting place in the daytime. At night it is sent to an open-topped pen on the gravel roof, where many hours in the fresh air should be beneficial after the long day indoors.

Our penguin is a sociable little fellow. He likes to have his head rubbed, and would rather take pieces of fresh fish from the hand than hunt for live minnows in the water. He submits cheerfully to being carried or handled, and waddles rapidly after his keeper whenever called, even following him upstairs. In stair climbing each step is taken at a jump.

This penguin is in immature plumage. For want of convenient literature it has not been identified with certainty. It is not that most northerly of penguins *Spheniscus mendiculus* of the Galapagos Islands nor *S. magellanicus* of the Straits of Magellan, with both of which the writer has had personal experience, but is probably *Spheniscus humboldti* of western South America.

When in the water the bird does very little diving as compared with swimming on the surface. In swimming it depends entirely upon its wings, the feet being extended backward with the soles at the surface of the water. Even in diving the feet are scarcely used except in turning.

When perched upon its raft, preening its feathers, the penguin takes many strange and even remarkable attitudes which might be better described as contortions.

In the matter of food, the bird sticks to the original diet of fresh fish cut in slices and scorns all mollusks, crustaceans and sea-weed. Its weight on October 4 was eight pounds.

A Huge Sponge.—Hon. Henry Brenneis, United States Consul at Cardenas, Cuba, has sent to the Aquarium the large sheepswool sponge shown in the accompanying photograph. It is nearly round and is twenty inches in diameter.

The sponge fishery of southern Florida has long been important, but there are also extensive sponge industries in Cuba, the Bahamas, Hayti, Colombia, and some parts of the Mexican and Central American coasts. The annual yield of sponges from American waters is valued at about $1,500,000. The United States Bureau of Fisheries has made great progress in the propagation of sponges by cuttings.

REAPPEARANCE OF THE TILEFISH.

By C. H. Townsend.

THIS remarkable deep-water fish was discovered in 1879, by the fishing schooner *William F. Hutchins*, while fishing near the hundred-fathom curve, south of Nantucket. Several thousand pounds were caught and a specimen was sent to the United States Fish Commission, where it was found to be new to science and described as *Lopholatilus chamaeleonticeps*.

It proved to be a good food fish, but before a regular fishery could be established, something unusual happened at the bottom of the sea and more than a million dead tilefish floated at the surface. This happened in 1882, and has been attributed to a sudden change in water temperature at the bottom.

The tilefish has of late become abundant on the old fishing grounds off Nantucket and the hundred-fathom curve off Long Island.

An effort is now being made by the United States Bureau of Fisheries to introduce it commercially. Under the auspices of the Bureau, shipments were made to the markets of New York City and specimens were exhibited at the Aquarium. At the request of the Bureau of Fisheries a desk in the office of the Aquarium was assigned to its representative during his publicity work in New York.

The fishing schooner *Stranger*, chartered by the Bureau, landed 8,000 pounds of tilefish at New York on October 21. The fish were distributed through market dealers, many going to hotels and clubs.

The largest fish, a thirty-pounder, was sent to President Wilson; the next largest, weighing twenty-three pounds, to the Aquarium, where it was exhibited on ice for a few days. This specimen was thirty-six inches long. A photograph of it appears on the cover of this Bulletin.

The tilefish which were marketed, attracted decided interest, many buyers of small lots returning with larger orders. The catch made by the *Stranger* was obtained in depths of fifty-eight to seventy-two fathoms, south of Nantucket.

It is believed that the tilefish is abundant enough to support an important fishery, and that it will be the means of adding an excellent food fish to our markets. It is easily caught and seems to be abundant at all seasons of the year within 100 miles of the coast. The tilefish reaches a length of three feet and a weight of thirty pounds, the average of those now being marketed being about eighteen pounds.

More Notes on the Tilefish.—Since the above was written, the *Stranger* made a trip to the tilefish grounds 100 miles southeast of New York Bay. She fished with trawl lines set in depths ranging from 62 fathoms to 107 fathoms, and in two days caught 816 tilefish, weighing about 11,000 pounds.

The largest fish weighed thirty-five pounds and was forty-two inches long. There were many of these large fish in the catch, most of them being taken in the lesser depths stated above, the smaller fish coming from the deeper water. The fish sold much more rapidly than the first catch landed the week before, the entire lot being taken from the vessel in about an hour and a half, at five cents a pound.

A walk through Fulton Market, just after the sale, showed that the tilefish had been well distributed among the fish stalls of the Market. The vessel will return at once to the tilefish banks and additional catches will be landed at New York and Boston.

The effort of the Fisheries Bureau to introduce this splendid deep-water fish to the markets has been crowned with a high degree of success.

New Porpoises.—As the Bulletin goes to press, word comes from Cape Hatteras that four porpoises have been captured for the Aquarium. They should reach New York about November 2.

THE FAIRMOUNT PARK AQUARIUM.

By Wm. E. Meehan, *Superintendent. Formerly Commissioner of Fisheries of Pennsylvania.*

THE Fairmount Park Aquarium in Philadelphia, occupies the buildings originally constructed for the Fairmount Water Works, on the banks of the Schuylkill River, and at the foot of the picturesque hill from which Fairmount Park receives its name. At present a temporary exhibit of fresh water fishes is made in old-fashioned, all-glass tanks in a large hall that is a part of the Aquarium group of buildings. The permanent exhibit is to be installed in two large so-called, subterranean rooms fronting the bank of the river and with the east side washed by a seal pool nearly 300 feet long and about 75 feet wide.

The roofs of these two structures form a plaza dotted by small buildings.

One room of the permanent Aquarium is 100 feet long and 50 feet wide, and the other is



GROUP OF BUILDINGS NOW BEING RECONSTRUCTED
Fairmount Park Aquarium.

200 feet long and 65 feet wide. The smaller is about completed and ready for occupancy. Until the other room is ready the smaller room will be used for both sea-water and fresh-water fishes, but when the larger room is finished, the smaller will be used entirely for tropical marine fishes and invertebrates. For the first there are twenty-five tanks with glass fronts, each seven feet long, five feet high and holding twelve hundred gallons of sea-water, also one tank fifteen feet long by six feet high with a capacity of nearly three thousand gallons.

For the invertebrates there are eight central all-glass tanks averaging each five feet in length with a width and height of two and one-half feet.

The larger room now under construction will have forty-four tanks five feet long and five feet high with a capacity each of about one thousand gallons and one tank thirty feet long and five feet high. This tank is in reality an enclosed pool, having a capacity of thirty thousand gallons of water. One side of the room will be devoted to marine fishes of the temperate zone and the other side to fresh-water fishes. In addition there is to be a central line of tanks averaging three feet in length for various types of gold fishes, tropical fresh-water fishes and small fresh-water fishes of the temperate zone, mostly carried in still water.

The exhibition tanks are constructed of concrete, lined with asphalt and fitted with the best and most modern devices obtainable to maintain the fish in good health. Travertine, a fossiliferous stone obtained in Ohio, is used for ornamental rockwork at the back of the tanks. Sea plants of certain species are being specially grown for planting in the tanks for ocean fishes and invertebrates.

The large hall now occupied by the temporary exhibit is to be fitted up as a lecture hall for free public lectures on aquatic life and for classes of school children to receive nature lessons. One of the small buildings on the plaza has been equipped with troughs and jars and with a green house for the hatching of fish eggs; another is utilized as the administration building. Two others are to be fitted up for exhibits and an open pavilion used for music on summer evenings and Sundays.

The City Councils of Philadelphia authorized the establishment of the Aquarium the latter part of 1911, and the temporary exhibit was hurriedly installed in order that the public might have something to see until the permanent buildings were completed. Unsuited as the hall is for the purpose, the temporary exhibit sprang into instant popularity and is visited



HALL FOR MARINE EXHIBIT
Fairmount Park Aquarium.



C. H. T. photo

BEAVER HOUSE ON BERGER BROOK

annually by more than 300,000. Sometimes as many as 10,000 visitors have crowded into the hall, fifty feet by fifty feet, on a fine Sunday. The Aquarium was designed by Superintendent Meehan, who also has supervision of the construction of the permanent plant. The Aquarium in Fairmount Park is under the direction of the Park Commissioners. The money for building and maintenance is supplied by the City of Philadelphia. While not definitely settled, plans are under consideration for a huge cascade to fall from the top of old Fairmount Hill into the open-air seal pool, a height of eighty feet, and for an exhibit on the grounds and perhaps in the buildings of pre-historic dinosaurs and other monsters, fashioned in concrete after the pattern of those in Germany.

THE BEAVER IN SULLIVAN COUNTY, NEW YORK.

"Ye shall know them by their works."

TO introduce beavers into new territory and four months later find that they have felled trees, built houses, constructed dams and taken up the usual activities of beaver life, is to be quickly repaid for one's labors. This is what has happened on the estate of Mr. Ambrose Monell. In May, 1914, Mr. Monell placed eight beavers on one of the small streams on the extensive tract belonging to him in Sullivan County, New York.

The animals were lost to sight until their presence was made known by their works, when it was found that they had built four houses with dams, in as many different places, no two being nearer together than one mile, the extremes being four miles apart as the water courses flowed. The largest dam situated on Berger Brook, is about seventy-five yards long and has a shorter supporting dam immediately below it. The house erected by this family of beavers rises from the water just inside the rim of the dam. (See cut above.)

Another family located on the Bushkill, a deeper stream, built a higher dam, with the house on the bank fifty yards above it. (See cuts on page 1297.)

These beaver families were well established when the writer visited them in June, 1915, and there is reason to suppose that they will increase faster each year. As Mr. Monell's lands include several thousand acres of forest with many brooks, the outcome of his experiment with beavers will be followed with interest by all conservators of wild life.

The restoration of the beaver to the Adirondacks has been a notable success. It will undoubtedly make itself at home on any forest stream where it can remain unmolested by man. Beavers were once abundant in all our northern forests and their skins were collected annually by thousands and sent to all countries where furs are worn.

Since the above was written at Mr. Monell's place in June, Mr. Edwin C. Kent of Tuxedo, informs me that the beavers have built still another dam on the Bushkill a quarter of a mile above the original dam, and have flooded a large part of the swamp. They have added considerably to the dam on Berger Brook and have built a new house on the brook about a quarter of a mile below the dam.

The activities of the beavers threaten to interfere with the owner's plans for trout fishing, as the dams already appear to harbor pickerel rather than trout. It is quite possible that these beaver dams in creating larger bodies of water will have the effect of modifying the character of the local fish fauna.

C. H. T.



C. H. T. photo

BEAVER DAM ON THE BUSHKILL
Sullivan County, New York

THE AQUARIUM PORPOISE.

THE bottle-nose porpoise (*Tursiops truncatus*) which lived in the large central pool of the Aquarium for more than twenty-one months, died on August 21.

The cause of its death was a mixed infection, which in a few days attacked every part of its skin, covering the smooth, glistening surface with unsightly pustules. This infection was clearly the result of keeping the animal in water pumped from New York Harbor, the only supply available for the large floor pools, under present conditions. The water of the harbor is always of low salinity and is charged with sewage, being especially foul in mid-summer.

The porpoise had grown perceptibly since its arrival on November 15, 1913. Its weight at death was 293 pounds and its length, eight feet. Four other porpoises received at the same time lived seven months in the Aquarium, when they died of pneumonia in rapid succession.

Like the one referred to above, their skins at death were also filth infected, although not to the same extent. Our experience has shown that the porpoise readily endures captivity and might live much longer if pure sea water were available. Other porpoises will be obtained in November, and equipment has at last been installed for filtering the harbor water. It will not be possible to clear this water of bacteria, but it has been made much cleaner, and is now quite clear.

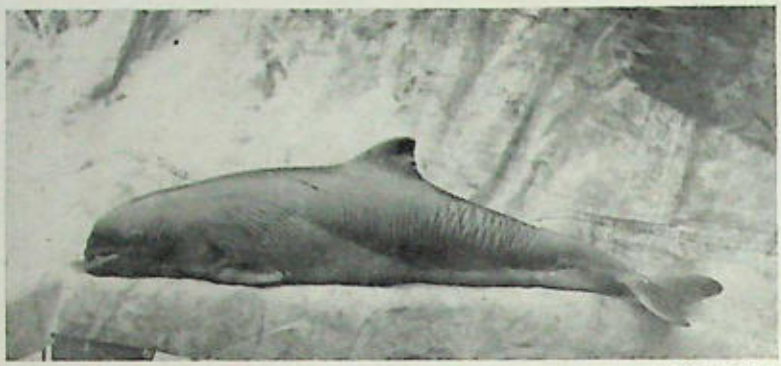
Our school of porpoises contained both sexes and they were often observed mating. The loss of the females was especially disappointing as the prospects for breeding in captivity were promising. All of these porpoises were constantly active. C. H. T.

A Deep Water Lobster.—While fishing on the Tilefish Grounds, 100 miles southeast of New York, on October 25th, the schooner *Stranger* brought up a very large lobster from a depth of 100 fathoms, measuring thirty-nine inches from tip of tail to end of large claw, and weighing sixteen pounds. The specimen is now on exhibition at the Aquarium.



C. H. T. photo

BEAVER DAM ON THE BUSHKILL
Sullivan County, New York



C. H. T. photo

HARBOR PORPOISE *PHOCAENA COMMUNIS*
Photographed at the Aquarium, 1914.

A NEW SPECIES OF FISH FROM FLORIDA.

By L. L. Mowbray.

WHILE engaged in collecting fishes at Key West for the New York Aquarium, I obtained, on August 8, three specimens of a species hitherto undescribed.

It belongs to the family Haemulidae or grunters.

I saw this Haemulon three years ago on the reefs near Key West, and was unable to trap it until this year. The specimens taken were adults from ten to twelve inches in length, and have been on exhibition at the New York Aquarium. Two of them are still living.

This grunt has a greater range of color changes than any other that I am acquainted with but its golden pectorals and the stripe of gold along the ridge of the back, which glistens in the sun, make it easy to distinguish. It is a very shy fish and darts from crevice to crevice.

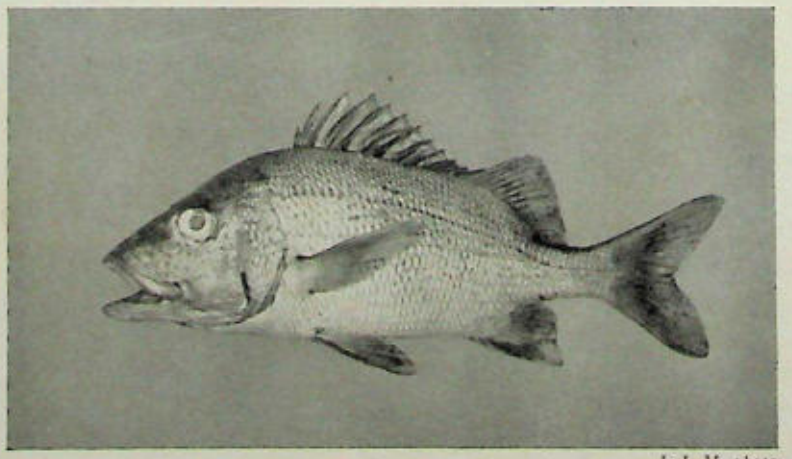
It may be described as follows:

Haemulon crysopterum,
new species.

Head, $2\frac{2}{3}$; depth, $2\frac{2}{3}$; D. XII, 15; A. III, 8; scales, 9-56-15; gill rakers, 10 x 14; eye, $4\frac{7}{8}$; maxillary, 2; second anal spine, $3\frac{1}{4}$; Interorbital, $3\frac{1}{2}$ in head; snout long, about 2 in head; fourth dorsal spine the longest, $1\frac{2}{3}$ in pectoral; $2\frac{1}{2}$ in head; second and third anal spines strong, about equal in length; tip of pectoral reaching vertical of depressed ventrals; preopercle moderately serrate; maxillary with a gentle curve. Body deep; anterior profile straight to vertical through orbit, gently convex to dorsal; ventral outline straight or nearly so; mouth large; red within; teeth strong for the genus.

Color in life silvery gray; interorbital to snout brownish; greater portion of preorbital, the whole of preopercle and opercle silvery gray. A median line of brown from interorbital to first dorsal spine. Sides with four clearly defined lines of brown, two above the lateral line, one on and one below; the one below running straight from center of eye to base of caudal: A broken wavy line, somewhat oblique, between this and the line above. Ventral surface freckled with brown, but subject to great change. Interspaces between base of dorsal and first and second lines on sides, upper edge of caudal peduncle and pectorals bright golden: Outer margin of dorsal rays, inner rays of anal and caudal, golden: The bases of all the fins dark; ventrals very dark, their anterior edge white. Eyes bluish: a dark blotch at angle of preopercle. Rare. Taken at Key West, Florida, August 8, 1915. Type No. 4,782, Am. Mus. Nat. Hist., New York.

New York Aquarium, October 21, 1915.



L. L. M. photo

A NEW SPECIES OF GRUNT
Haemulon crysopterum, sp. nov.