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# ZOOLOGICAL SOCIETY BULLETIN





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ARTHUR FREUND, DES.

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# ZOOLOGICAL SOCIETY BULLETIN

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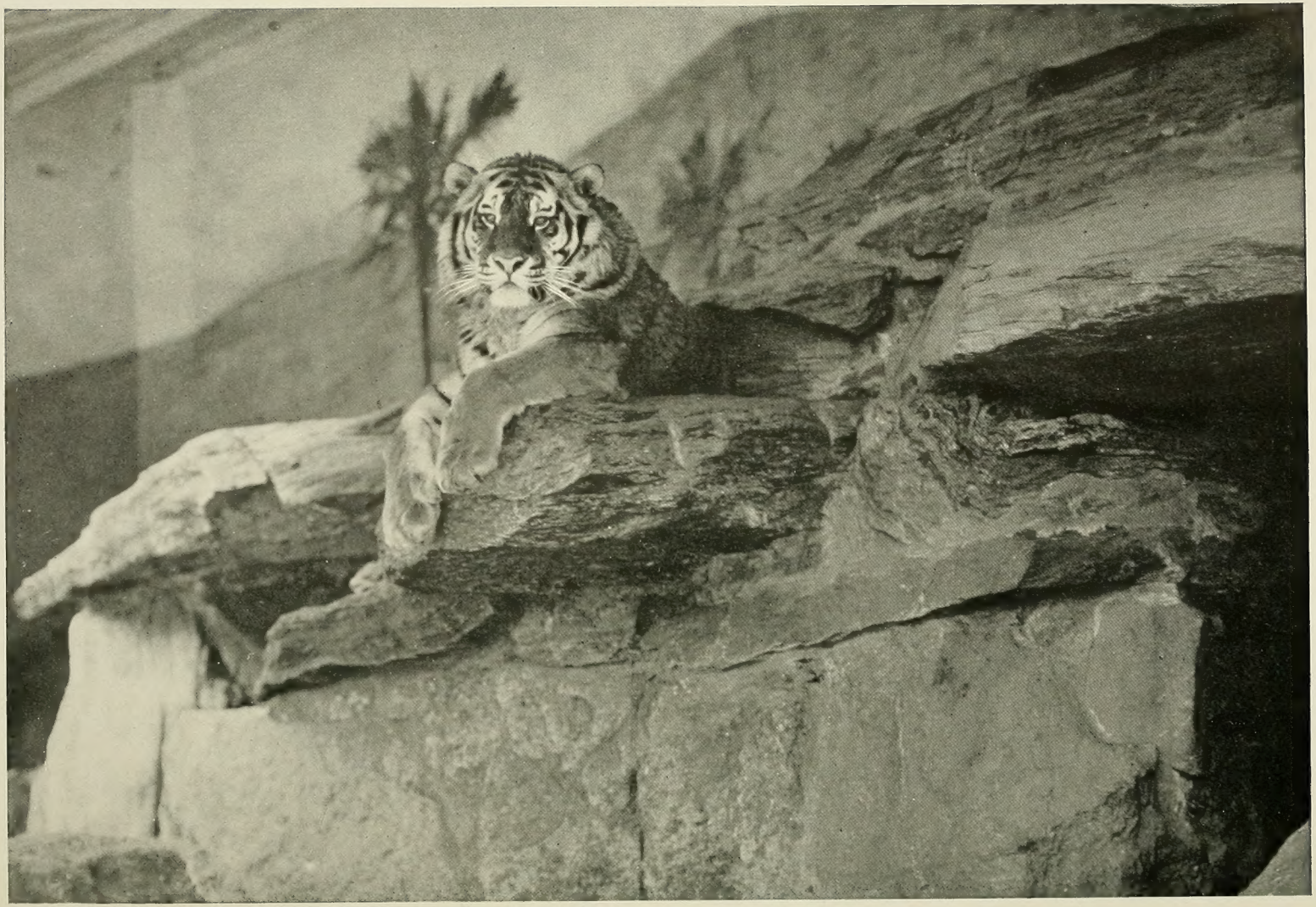


SIBERIAN TIGER

# ZOOLOGICAL SOCIETY BULLETIN

*Published by the New York Zoological Society*

Vol. XVI MAY 1912 Number 51

## THE WIDE-HORNED WHITE MOUNTAIN SHEEP

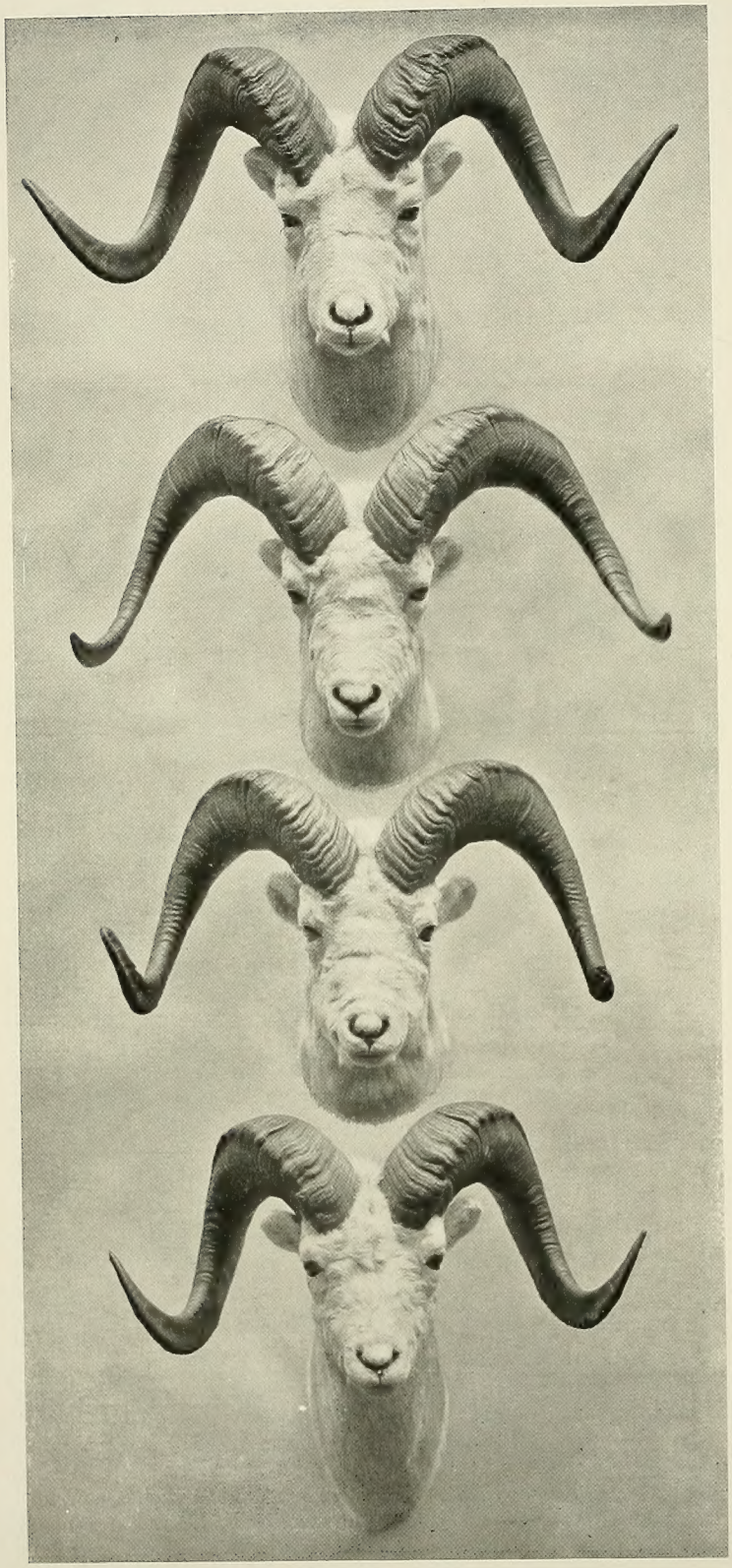
*By* William T. Hornaday

RECENT hunting trips to Yukon Territory made by Wilson Potter and Henry Disston, Jr., of Philadelphia, resulted in the discovery by them of the most remarkable White Mountain Sheep specimens that (so far as known) have come out of northwestern America. The species represented is *Ovis dalli,* but the fact revealed by the specimens is new and startling. At the last moment before closing this manuscript, the National Collection of Heads and Horns received, as a gift from Frederic H. Osborn, of New York, a nephew of President Osborn, an *Ovis dalli* head that unmistakably belongs in the same class as the Potter-Disston specimens.

The ordinary horn architecture of the white sheep, as found in Yukon Territory and eastern Alaska, and also in the Kenai Peninsula, is quite well known. Described in a few words, it is essentially a refined and compacted version of the standard horns of the Rocky Mountain Big-Horn, with the addition of long, slender points that sometimes abruptly thrust outward from the face. Sportsmen call it a close spiral, because, instead of opening out widely from the face, the middle section of the horn descends almost parallel with the cheek, and not far away. Not infrequently, however, a white-sheep horn of extreme length will thrust a long, slender point outward almost at a right angle with the face. Occasionally, also, a black mountain sheep develops horns of great spread in proportion to their length, but such cases seem to be exceptional. The proposition that wide-spreading horns constitute a distinguishing character of the black sheep species has been strenuously denied. Thus far no locality, so far as we are aware, has developed a common type of widely spreading horns, even of the black sheep.

The specimens under consideration are remarkable because of the fact that they represent a horn type never before seen by the writer in *Ovis dalli,* either as a distinct local type or otherwise, and also because there are so many of them (from the same locality) that they compel attention. Their unusual size may be mentioned as a third feature of interest.

The series of specimens consists of six mounted heads, and while they have not been all cast in the same mold, their characters are fairly uniform. Without descending for any distance parallel with the cheek, these horns spread outward, continuously, until at least four of the six acquire tip-to-tip proportions and openness of spiral that are remarkable for *Ovis dalli.* In general terms, Mr. Potter's No. 1 is a fairly exact counterpart of a fine head of *Ovis karelini* in the National Collection of Heads and Horns, which measures in length 44½ inches, spread between tips 36 inches, and in circumference 13¼ inches.



HEAD No. 1—(Mr. Wilson Potter)

| | Inches |
|---|---|
| Spread, tip to tip | 34½ |
| Length on curve | 44¾ |
| Circumference at base | 14¾ |
| Age | 7 years |

HEAD No. 2—(Mr. Henry Disston, Jr.)

| | Inches |
|---|---|
| Spread, tip to tip | 30¼ |
| Length on curve | 37¼ |
| Circumference | 14⅛ |
| Age | 6 years |

HEAD No. 3—(Mr. Henry Disston, Jr.)

| | Inches |
|---|---|
| Spread, tip to tip | 27½ |
| Length on curve | 40½ |
| Circumference | 13½ |
| Age | 7 years |

HEAD No. 4—(Mr. Henry Disston, Jr.)

| | Inches |
|---|---|
| Spread, tip to tip | 26½ |
| Length on curve | 38½ |
| Age | 7 years |

THE WIDE-HORNED WHITE SHEEP

KARELIN SHEEP.
*Ovis karelini*, (Severtzoff).

| | Inches |
|---|---|
| Spread, tip to tip | 36 |
| Length on curve | 44½ |
| Circumference | 13⅛ |

Loc.—Chinese Turkestan.
Head in the National Collection of Heads and Horns.

HEAD No. 5—Mr. F. H. Osborn's Gift to N. C. H. H.

| | Inches |
|---|---|
| Spread, tip to tip | 29 |
| Length on curve | 41⅜ |
| Circumference | 14¼ |
| Age | 8 years |

WHITE MOUNTAIN SHEEP.
Typical Specimen, showing the ordinary close spiral.
Head in the Reed-McMillin Collection, National Collection of Heads and Horns.

REAR VIEW OF HEAD No. 1.
(Mr. Wilson Potter)

All the heads shown in this article have been photographed and reproduced as nearly as possible on the same scale.

SHEEP HEADS SHOWN FOR COMPARISON

The specimens under notice at once strike the observer as representing something new in the horns of American mountain sheep. A single specimen, even of an extreme type, would readily be accepted as an individual or freak development; but with six specimens, practically from the same locality, and another one coming greater than any in hand, it is in order to look seriously into the question that they present. The following comparative measurements are of interest, because they represent four localities and are strictly comparable, all being selected heads.

*OVIS DALLI* HORNS, SPREAD BETWEEN TIPS, (in inches).

| | | | | | |
|---|---|---|---|---|---|
| 1. The Wide-Horned heads: | 34½ | 30¼ | 27½ | 26½ | 29 |
| 2. Charles Sheldon's heads, Ogilvie Mts. | 25 | 23 | 17½ | 17 | 17¾ |
| 3. Charles Sheldon's heads, Pelly Mts. | 20¼ | 18 11/16 | 17¼ | 17⅛ | 17¼ |
| 4. Reed-McMillin heads, Kenai Penin. | 23⅝ | 20⅝ | 19⅞ | 19 13/16 | 20⅛ |

THE SAME HEADS, LENGTH ON CURVE.

| | | | | | |
|---|---|---|---|---|---|
| 1. The Wide-Horned heads | 44¾ | 37¼ | 41⅜ | 38½ | 40½ |
| 2. Sheldon heads, Ogilvie Mts. | 29½ | 30 | 27 | 36⅝ | 32 |
| 3. Sheldon heads, Pelly Mts. | 38½ | 32 | 35⅛ | 28¾ | 36¾ |
| 4. Reed-McMillin, Kenai Penin. | 34½ | 36 | 38⅜ | 35⅛ | 36⅝ |

It is not often that the measurements of skulls or horns tell a story as striking as that revealed by the measurements of the four groups of heads set forth above. It seems hardly necessary to write down the conclusions they at once suggest; but at the same time it may be well to do so.

These four groups of heads represent four widely separated localities in the range of *Ovis dalli*. On a map of northwestern America the Kenai Peninsula, Ogilvie Mountains and Pelly Mountains form a great triangle, near the center of which is the locality which furnished the five wide-horned sheep heads here noticed.

The measurements show that the fifteen specimens composing Groups 2, 3 and 4 are not noticeably different from one another. They do not spread widely, and they are by no means particularly long. In fact, they are all of the same general type—small, of medium length, and close in spiral.

The five specimens in Group No. 1, are equally alike, but their great spread, great length, and wide-open spiral place them absolutely in a class by themselves. As yet we do not know the western limit of the wide-horned sheep, but we venture the prediction that an investigation of all the wide-horned *Ovis dalli* ever sent out of the Northwest will reveal the fact that they have come from Southwestern Yukon Territory, or northwestward thereof, in the direction of Mount McKinley.

After an examination of these specimens, the question naturally arises, what do they mean?

Distinctly, I think they do not represent a new species, nor even a sub-species. It is reasonably certain that as the collector progresses outward from the locality of the Disston-Potter series, a complete series of intermediate horns will be found, grading down to the standard form of close-spiral horn architecture as found in *Ovis dalli* generally throughout the best-known ranges of that species.

It is, however, my belief that in the locality which furnished the wide-spreading horns described above, we have found Nature virtually in the very act of developing and striking off a wide-horned and long-horned sub-species of *Ovis dalli*. Having hazarded a guess that these sheep were developed in a region where sheep food was particularly abundant and rich, Mr. Potter immediately replied:

"Yes; that locality is on the eastern slope of the main range, where spring comes early, and the food for sheep is the finest that I ever saw."

Under such conditions, it is not at all difficult to imagine that in 200 years of quiet and uninterrupted breeding, carried on by the fittest of such rams as these, the result might easily be a new species closely paralleling *Ovis karelini*, and larger every way than *Ovis dalli*.

As conditions of slaughter are to-day, the locality which produced these sheep will be invaded and shot to pieces by an eager army of sheep-hunters, just as soon as its name is made known; and thus Nature's last attempt at species-making in American sheep will come to an untimely end. As this breed disappears, and, at least while we are bidding it farewell, we will call it the Wide-Horned White Sheep, locality Yukon Territory.

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*Duck Collection.*—The collection of ducks now installed on the Wild Fowl Pond is unusually complete and will well repay inspection. There are about 350 specimens of some twenty-three species, including several of the diving ducks of the genus *Marila*. All of the males are now in full nuptial array and present a much more striking appearance than will be the case later in the summer, when many take on the eclipse plumage.

EVERY BRANCH TREMBLES WITH THE WEIGHT OF VULTURES
An Adjutant is Perched on a Bough in the Center Picture

# THE SCAVENGER BIRDS OF INDIA*

*By* C. William Beebe
*Curator of Birds*

We who enjoy the comforts of Western civilization, seldom give a thought to the perfection of operation and concealment of our vast sanitary and other systems. Occasionally the intricate lines of sewers, the mighty water-pipes, the mesh-work of electric wiring are laid bare in our streets; all that necessary subterranean plexus which makes life pleasant or possible in our great cities. But to realize that there are lands where, between scores of millions of human beings and the most dread diseases due to unsanitary conditions, are bulwarks only of hosts of feathered beings, great and small, is a new thought, and one which should abate every feeling except of interest and appreciation.

Even before one's steamer comes within sight of the low marshy shoreline of India, there is evidence of the bird scavengers of that country. Hardly have the propellers begun to churn up the muddy water of the Hoogly, many miles from land, than gulls of several species come screaming toward the vessel and from thence onward every port-hole, every motion of the passengers is kept under surveillance, until a stray bit of bread or other refuse draws the flock downward in swift spirals to the water.

Gulls in this rôle are familiar even in our New York harbor, but when we enter the Hoogly itself a new element is introduced, the kite—the Brahminy kites with their long graceful wings and deep cleft tail, clad in strongly contrasting hues of white and rich chestnut, and the less conspicuous brown pariah kites of the city itself. These birds are adapted both in swift flight and grasp of talons for a life of pursuit and capture of living creatures, but they have chosen the easier method of livelihood in this land teeming with mankind, of subsisting upon refuse. Our country is not without a parallel, for along the

* These notes were made chiefly in the vicinity of Calcutta and Rangoon. The birds mentioned are the following:—Brown-headed Gull—*Larus brunneicephalus;* Brahminy Kite—*Haliastur indus;* Pariah Kite—*Milvus govinda;* House Crows—*Corvus splendens and insolans; Jungle Crow—Corvus macorhynchus;* White-backed Vulture—*Pseudogyps bengalensis;* Adjutant—*Leptoptilus dubius.*

A HUNDRED VULTURES FLAP TO THE FEAST

A STRUGGLING PILE OF BIRDS

shores of Maine and Nova Scotia it is not an uncommon sight to see the bald eagle itself walking ungainly about in search of the refuse of the fishermen. The kite of India has brought unusual facilities to aid him in his new field, and the more we see of him the more we admire the *savoir-faire* which he shows in his mastery of the water, the earth and the air. One never tires of watching these birds about the harbors, now soaring, now perching upon the rigging, now swooping to the surface and with wings and tail lifted, daintily seizing some morsel with their talons. A few flaps then take them upward and give such impetus that the feet may be stretched forward to meet the beak, when the bird proceeds to feed as calmly and leisurely as if the process of flight needed no supervision, the wings and tail apparently taking care of themselves, supporting and steering their owner safely until the last bit of food is swallowed, when the faculties of the head again assume command.

In the city itself—Calcutta or Rangoon—the Brahminy is not seen, the brown pariah kite holding sway as best he can against a new rival, the house crow. Much has been written of this latter bird but still more remains unsaid. As the two kites have each found their niche in life, so the guilds of house and jungle crow keep more or less to their appointed zones of influence. In comparison with the house crows of India, our English sparrow is wariness itself. The crows will enter one's very room at the hotel in search of food, and when dining on an outside balcony, if a table is left unguarded for a moment, a black-winged arrow descends straightway upon toast or butter and bears it off in triumph before the turbaned waiters can move a step. The house crow is trim and sleek, pleasant to look upon and with a brain which has few equals among the class of birds.

As we leave the heart of the city, the superiority of the crows diminishes, giving way to the greater brute force of the pariah kites and dogs, but it is not until we reach some suburb that we enter the realm of the greatest of all scavengers, the great vulture host of India. Unlike all the lesser factors in this field of usefulness, these great birds ply their trade with the least amount of effort; in fact, even a keen observer of bird life, might travel in India for many scores of miles without seeing a single vulture. But at the appointed time and place, no more wonderful sight awaits the ornithologist than the gathering of these clans.

When near a large Indian city, one treads some great road like that which delighted the heart of Kim, there comes to the ear the loud call of mynas, and the harsh notes of magpies or rollers; a distant crow may give voice or a kite squeal from a house-top. The sky is clear, blazing blue, marred by neither cloud nor the form of any bird. A horse or bullock falls by the roadside and is surrounded at once by a shouting, gesticulating crowd of natives. A crow flies over and adds his shout of approval to the uproar, thereby summoning all of his clan in the neighborhood.

Later the stricken animal is carried away to some spot set apart for the city refuse, but long before it has reached its destination a great shadow passes and with a loud rush of wings a huge brown form swoops low overhead and swings up to the topmost branch of a dead tree. A glance upward shows the sky full of vultures all descending swiftly in great spirals focussed upon this single speck of earth. Dozens are close at hand, scores of others afar off, while the straining eye discovers, now here, now there, still more coming constantly into sight, at first the least of motes against the blue, then taking form and motion, and finally assuming the individuality of species. Every branch of every nearby tree is atremble with impact after impact of the great weight of bodies. Finally when every available arboreal space is occupied, the walls are filled. The living fringe of crows which tops the walls becomes gradually replaced with vultures. When the last perch is filled, the latecomers are compelled to settle in the open fields, forming densely packed mobs of several hundred birds—standing room only. Always the kites, which have collected in numbers, weave an intricate aerial net-work over the fields and in and out among the trees; they too, with the crows, must abide their time. A disturbance in one of the trees draws attention to an adjutant which has alighted on several of the vultures, when gently but firmly seizing their necks in his great beak, he tumbles them without injury off the branch to make room for himself. He represents another link in the endless chain of bird scavengers in this land, and as the kite has deserted the more noble proclivities of his aquiline kindred, so the adjutant has abandoned the clean feeding of the storks to join the vulturine profession. With beak and wings he forces his way to the perch, but for many minutes the attacks of all his neighbors render his position uncertain, until the attention of the combatants is distracted by the approaching object of their desires.

Not a bird moves while the dead animal is brought to the center of the waiting host, and only the hundreds upon hundreds of craning necks and unwinking eyes express the pent-up

eagerness, the unappeasable hunger which a vulture seems ever to typify.

I shall never forget the impression which this scene made upon me; the hosts of lesser folk, crows and mynas, cawing and screaming; the scores of kites squealing their loudest, and finally the great silent, intent host, line upon line, crowd upon crowd in every direction.

As the last native walks way, a vulture upon the topmost bough leaps from his perch and with all his might flaps toward the feast; ten, a score, a hundred follow at his very tail and the scavengers are at their work. There is nothing unpleasant or revolting to the eye. From the moment the first vulture alights on the carcass until the last bird flaps reluctantly away from the clean-picked bones, nothing is visible but a struggling pile of birds, two, sometimes three deep, with dozens constantly leaving, and their places taken at once. Men who have witnessed such scenes dozens of times, say that a horse or bullock will be completely devoured within nine to eleven minutes after the first vulture arrives. When the vultures have done, the crows consume every remaining scrap, and the bones await whatever use the needs of mankind require. Thus swiftly does the beast of burden fulfill its physical reincarnation in these eastern lands, and thus is wrought safety for millions of human beings, where otherwise plague and disease would work their utmost havoc.

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## ITEMS OF INTEREST

### *Bird Department*

*Mating Geese.*—The most uncommon event so far is the mating of a female graylag goose with a male pink-footed. These birds constructed a bulky nest and four eggs were deposited early in April. This is a really remarkable occurrence, and a detailed account will appear in a future BULLETIN.

*Wintering Ostriches.*—The ostriches, which have now passed their second winter in the open, have come through in perfect condition. The success of this experiment in acclimatization, which seemed decidedly risky at first, is now established beyond a doubt.

*A Rare Turkey.*—Quite without expectation, an apparently perfect female of the beautiful ocellated turkey reached us recently from Yucatan. This species is as delicate as it is lovely and has so far defied our most determined efforts to persuade it to live with us. All of our individuals have arrived during the period of cold weather, and invariably have been infected with roup or tuberculosis before arrival. The present bird, however, appears to be in better than average health, and we hope to be able to acclimatize her.

*Friendly Gulls.*—The unusual abundance of herring gulls in the neighborhood of the Zoological Park this spring induced us to place a daily supply of cut fish at convenient points about our lakes. The birds were not slow in taking advantage of our hospitality, and we have been rewarded by the constant presence for several weeks of these masters of flight. No doubt we shall soon be deprived of the pleasure, for most of the birds depart in April for the northern breeding grounds. They generally return in October, and perhaps we may be so fortunate as to be able to persuade some, at least, to pass the winter with us.

*Soiled Water-Fowl.*—A road that sends forth clouds of dust in the wake of every passing automobile is unquestionably an abomination. It was doubtless the ambition of the worthy persons who recently sprayed the surface of Pelham Avenue with crude oil, to remedy a condition which has caused much annoyance. The task was well performed—so well, in fact, that enough oil remained upon the surface of the road to entirely cover Cope Lake and Lake Agassiz, when washed into the water by a drenching rain. This oil has had a remarkable effect upon the plumage of the water-fowl quartered on the lakes. Mallards and black ducks are now indistinguishable, by color, at least; barnacle, white fronted and Canada geese are a homogeneous and non-committal black, while the once white swans are a truly pitiful sight. As soon as the oil has passed down the Bronx River an attempt will be made to restore the feathers of the swans to their former snowy state, but inky geese of various sizes will continue to puzzle inquiring visitors until after the annual moult.

*Nesting Water-fowl.*—Although spring has been delayed, the Bird Department hopes for an unusual number of breeding successes when the vernal season does arrive. In a few cases, nesting operations have already begun. Several pairs of Canada geese are incubating, the first egg appearing on April 5. Mallard ducks antedated the geese by at least a week, and it is quite safe to say that a fairly careful search of the various nesting localities in the Zoological Park would reveal fully 100 nests of this enterprising bird.

The Cereopsis geese, which lost their brood of goslings in 1910, as a result of a local epidemic of parasitic bronchitis, have been busily constructing a nest in the Crane Paddock, and eggs will doubtless follow in due season. Ruddy sheldrakes, wood, mandarin and probably other ducks, are diligently home hunting. L. S. C.

ZOOLOGICAL SOCIETY BULLETIN

Departments:

*Mammal*
W. T. Hornaday.

*Reptile*
Raymond L. Ditmars.

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

*Bird*
C. William Beebe.
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Elwin R. Sanborn, Editor.

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## THE TRAGEDY OF THE GREBES.

Because of the almost unprecedented duration and frequent occurrence of periods of very low temperature, the winter of 1911-12 was an unusually severe one for those species of birds which commonly pass that season with us. In the vicinity of New York, conditions were somewhat ameliorated by the absence of deep snow, but in the northern portions of the state the reverse was the case.

The Finger Lakes of central New York—more especially Cayuga, Seneca and Keuka—have always been a haven for great numbers of water-fowl during the winter months. Large flocks of ducks take advantage of the open water to feed on the succulent aquatic plants, crustaceans and insect larvae, and numerous loons and grebes pursue the fishes which form their daily fare. Only at long intervals are these lakes frozen over, and the birds become accustomed to resorting there with confidence. Induced by the unseasonable mildness of the early winter, many others lingered on their southward journey, so that the number of individuals during the past season probably was even greater than usual.

When the sudden fall in temperature came, the birds found themselves in a serious predicament. Their feeding grounds were frozen over completely or so restricted that the available food was quickly devoured. As the ice encroached farther and farther and the circle of open water drew closer, it seemed that starvation must overtake the flock. At this juncture, however, the State Conservation Commission took a hand and the ducks were supplied daily with grain. We are informed by Mr. Llewellyn Legge, Chief Game Protector, that in February about 5,000 ducks were being cared for in a space in Seneca Lake, kept open by the movement of the water from a large spring.

For the grebes and loons, however, this treatment was of no avail. Strongly specialized for pursuing darting fishes under water, they are almost helpless when out of that element. Loons are able to stand erect only upon the entire tarsus and cannot rise on the wing unless a good expanse of open water allows a flapping start. Grebes are not at quite such a disadvantage when ashore as are loons, all of our species being able to stand firmly upon the toes and get about fairly well. It is probable, however, that they cannot rise from the land, even when space offers for a running start.

Finding themselves being closed in by the ice and the food supply no longer accessible, these birds, possessing, perhaps, more initiative than the ducks, took wing while still able to do so and started on a search for open water. As might be expected, the flight was in a southern or south-easterly direction. The loons seem to have succeeded fairly well in reaching some haven, only one instance of disaster having come to the notice of the writer. This bird, reported as a Red-throated Loon (*Gavia stellata*), was stranded near Utica and died shortly after a game warden had chopped it out of the ice from which it had been unable to extricate itself. This unfortunate ending may have been hastened by the well-meaning but misguided warden, who placed the bird in a warm bath and supplied it with canned salmon!

The grebes, however, were less fortunate. Weakened by lack of food, and, no doubt, bewildered by the apparent absence of their natural element, they dropped wherever fatigue overtook them. Floundering in the deep snow, the miserable birds must have perished in great numbers. Many doubtless fell prey to foxes and other predacious creatures. Between February 11 and 28, 1912, no less than thirteen Holboell Grebes (*Colymbus holboelli*), shipped from Syracuse, Canajoharie and Rhinebeck, arrived at the Zoological Park, all considerably the worse for their experience.

When one considers the widely separated localities and the slimness of the chance that any individual bird would drop near a road or in some other place sufficiently travelled for the waif to be discovered, it is not difficult to believe that the number of those which died unfound must have been large indeed.

This instance forms an excellent example of the effect of natural conditions on the fluctuating status of species. For a bird of more concentrated distribution than that of this grebe, a

calamity of this sort might easily result in total extermination. Even now, there can be no doubt that the Holboell Grebe has experienced a severe check, from which it may be some time in recovering. In the *Auk* for April, 1912, John H. Sage records that "an unusual flight of *Colymbus holboelli* was noticed here during the month of February, 1912." At least ten helpless birds are known to have been picked up, most of them unable to rise from the ice which covered the Connecticut River. The effects of the severe winter, then, were evidently widespread, and one can readily believe that the ranks of a species even so widely distributed as *Colymbus holboelli*, have been very materially reduced. L. S. C.

## AN AMERICAN BIRD PROTECTOR IN SAMOA

*Extract from a letter written by* Mason Mitchell, *American Consul at Apia*

"For the past year or more I have been trying to induce the German Governor of Samoa, Dr. Schultz, to issue laws to protect the birds of these islands. With the exception of the Tooth-Billed pigeon, no protection has been given to any bird. In consequence of this, the Lupi (Lavender-Neck Fruit-Pigeon), has decreased over fifty per cent. in the last ten years. Without protection, five years hence, they will be as scarce as the Manumea (Tooth-Billed Pigeon), especially if they are not protected in the breeding season. Formerly they were the most numerous of the six varieties of pigeons found on these islands. They are extensively shot for food, and are sold by the natives at twenty-five cents each.

"No one, either white or native, knew when or where the Lupi nested; and some averred they migrated to other islands to breed. This I have found to be untrue, for they nest in these islands, high up in the forest trees, in the parasitic plant which grows in tree-forks, called by the Samoans the laumapapa, or in English the bird's nest plant (*Asplenium nidus*). They hatch in October. I have seen both their nests and young birds. For this interesting bird I have advised a close season from August first to December.

"The Governor informs me the common council will take the matter up, and be guided by my advice. If they fail to do so, it will be another case like that of the passenger pigeons in America.

"I have secured protection for all the perching birds, for all time, in addition to all birds outside of the two varieties of fruit pigeons, the aquatic birds, and members of the snipe family. Ducks need no protection. Inasmuch as the natives are unable to shoot on the wing, but few ducks are killed; and the snipe are migratory and do not nest here."

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December 12, 1911 to April 4, 1912

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Carl E. Akeley,
Samuel F. Sanford,
Dr. John C. Phillips,
Marion McMillin,
Allison V. Armour,
Z. Marshall Crane,

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CANVAS-BACK DUCKS ON THE WING

## STORM-BOUND DUCKS

Wild ducks wintering at Branchport, New York

*By* C. William Beebe *and* Verdi Burtch

THE past winter has been one of unusual severity on the bird and animal life of our northern states. It is difficult enough for the wild creatures to wage their never-ending warfare against living foes and especially man, but when to these a sudden onslaught of storm or cold is added, they have small chance of survival. At such a time the birds and animals of prey are correspondingly hard pressed to find food, and the storm-bound victims can expect from their enemies only increased energy in pursuit and capture.

Under such conditions, man should not only entirely curb his hunting and sporting proclivities, but he should do dynamic work in helping the weakened creatures to tide over the period of danger.

During the past month the Zoological Society has received several canvas-back ducks that were picked up in a starving condition, and it was learned that in many parts of New York State ducks by the hundred were brought to starvation by the continual frozen condition of their feeding waters. It is most gratifying to learn that in a number of instances, large numbers of wild-fowl were saved by systematic feeding, both on the part of game wardens and private individuals. It is also a matter for sincere congratulation that, owing to the recently inaugurated law preventing the shooting of ducks in late winter and spring, untold numbers of these birds were saved from death at the hands of persons to whom sympathy for any wild creature is an unknown characteristic. Mr. Verdi Burtch has most kindly sent me the following notes and photographs relating to the ducks which wintered near his home at Branchport. This is in west central New York, just west of Seneca Lake. I give the notes in full, as they present so vividly the struggle for life which these splendid birds wage day after day against the elements.

At the head of Lake Keuka, near Branchport, is a sandbar formed by the inlet on the north and a big gully on the west, which cuts off the harbor from the remainder of the lake. A channel one hundred and fifty feet wide has been cut through this bar to admit boats to the harbor. This channel never entirely freezes over, even in the most severe winters like the one just past, owing to an ever present current flowing from the lake into the bay and back again.

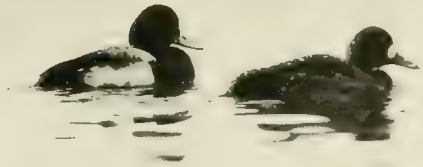
After the lake had frozen over this winter, ducks gather in the channel to the number of several hundred. About one-half were canvas-backs, while the remainder was about equally divided between American golden-eyes and American scaup, with a lone butterball and a few redheads.

I first visited the channel on February 12, at which time they were all able to fly. As I approached, the canvas-backs arose first, then the golden-eyes and then the scaups, a portion of the latter, however, flying only to the other side. All the scaups and some of the golden-eyes and canvas-backs returned and alighted in the water, while the remainder settled on the ice, well out in the middle of the lake.

A female canvas-back, after circling a few times, became exhausted and fell to the ice, but struggled along until she reached the water. Twelve black ducks were there on February 16, and a few redheads on the 17th.

EXHAUSTED CANVAS-BACK
Struggling to reach the water

AMERICAN SCAUP DUCKS
Male in the lead, two females following



AMERICAN SCAUP DUCKS
Male and Female

On February 18, Mr. C. F. Stone and myself once more observed the ducks closely, when some of them appeared to be weak. We went out to examine those that were on the ice, and picked up a male scaup that was unable to fly. When we got back to the channel we found a dead male canvas-back floating there, and fished it out. It was very thin and had evidently died of starvation. Mr. Stone took the captive scaup home and fed it with minnows and scraps of beef, which it took from the hand, and was so eager that it would peck at his finger or coat sleeve. This bird died after he had it about a week.

On the morning of February 19, Frank Verder put a lot of wheat into the water and picked up a dead male canvas-back and a dead male scaup. I threw a lot of chopped cabbage into the water, and I think that the ducks ate some of it, and cleaned up all of the wheat as well. I picked up a male canvas-back that was out on the ice unable to fly, and found a dead female golden-eye on the ice that had a hole pecked in the abdomen, doubtless the work of a herring gull.

February 22 was extremely cold, with very high winds, and altogether it was one of the roughest days which I can remember. The following day was bright with no wind. There was not one-half as many ducks in the channel as before, and very few were canvas-backs. I think that they must have arisen during the wind storm, and were blown over to Seneca Lake, where there was more open water. Two male canvas-backs that had been picked up on the ice in the inlet, unable to fly, were brought to me.

On February 24 I found only ten canvas-backs, thirty-six black ducks, about thirty American golden-eyes and American scaup, and one butterball. On February 25 the butterball, two males and a female canvas-back, nine golden-eyes and a few scaups were out in the lake on the ice, and a dead black duck and a dead scaup were floating on the water.

On March 3 only a female scaup and the butterball were left. A dead canvas-back lay at the edge of the ice, and in the middle of the lake a gull was busily feeding on a dead golden-eye.

On March 10 the little butterball was the only bird left of the original flock, and it appeared to be well and strong. More ice had formed, leaving but a small space of open water, in which floated the butterball and a Holboell's grebe. When I approached, the butterball rose and was on the wing for at least ten minutes. It must have been able to catch many minnows here, because it had endured the long cold spell very well.

About two hundred black ducks were in the channel every morning after March 10, working up the inlet during the day where there was considerable open water. No canvas-backs or scaups were seen after March 3, and no golden-eyes after February 24. On March 17 the ice began to break up in the inlet, and then hooded mergansers, mallard and black ducks were seen. The butterball and Holboell's grebe were still in the channel on March 15.

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*Rearranging the Bears.*—The polar bear presented by Mr. Rainey, and temporarily occupying an outside cage of the Lion House, has been removed to Silver King's old quarters. Some of our visitors declare this bear to be a finer specimen than Silver King. She does not weigh as much, but her pelage is so very thick and white that she seems larger by comparison. The animal will undoubtedly enjoy the pool in her new quarters.

IMPERIAL PARROT

## THE IMPERIAL PARROT

*By* C. William Beebe
*Curator of Birds*

On the nineteenth of February the Zoological Society came into the possession of a parrot hardly second in interest to the rare Carolina conures or parrakeets described in the last number of the Bulletin. This is the Imperial Amazon Parrot (*Amazona imperialis*) of the Island of Dominica. Its demand on our interest is for the most important of all reasons—that of a vanishing race, soon to become extinct; the ever-tragic eclipse of a living creature which has slowly evolved through all the ages past. In this case the details make it all the more lamentable, for this bird is worthy of its name—in size and beauty far excelling others of its group; and for the cause of its rarity we need look no further than the wilful, needless warfare waged by ignorant human beings upon the living creatures of the earth.

Over three-quarters of a century ago one of these parrots was living in the London Zoological Gardens and it was this very bird which was first described by Mr. Vigors who named it *Psittacus augustus*. After passing through the fiery furnace of modern nomenclatural revision, this has finally emerged as *Amazona imperialis*. But though the terms are altogether changed, recognition of the beauty of the bird has always remained, whether we speak of it as the August or the Imperial.

In 1865 on the presentation of a second specimen to the London Society, we learn from the donor, Mr. Bernard, that even then it was a very rare bird in Dominica, and in its haunts in the central mountains, only one or two were obtained annually. This second bird lived for about six years. Since that time a third has been exhibited in London and another bird is in the possession of an English aviculturist. So as far as actual numbers in captivity, this bird is even rarer than the Carolina parrakeet.

The Imperial Amazon is by far the largest of its genus—a genus which is composed of at least forty-five forms, which range from Mexico throughout the West Indies and South America to Argentina. It is as large as a cockatoo, measuring twenty-one to twenty-two inches in length and with a stretch of wings of three feet. The coloring of our bird is brilliant and exceedingly harmonious in tone. The head, neck and under parts are purplish-brown, the feathers tipped with green on the crown and with pale lavender on the cheeks and lower plumage of the body. The nape is purplish-black, and when the bird is excited, these feathers are elevated into a conspicuous ruff. The upper plumage, sides, flanks and wings are green, with scarlet showing along the edge of the wings and on the flight feathers. The tail is chiefly of a rich warm maroon. Its eye is unusually striking, the iris being bicolored—an outer ring of bright scarlet and an inner one of pale hazel. It is impossible, however, to give a perfectly accurate description of the colors, as the tips of many of the feathers are highly iridescent. In one light the plumage of the under parts appears concolorous—of a dull coppery hue; but when the bird turns sideways to the light, there flash out on every feather, consecutive bands of the most brilliant green, purple and violet.

So our bird, which is a female, is a prize indeed, not only from the sentiment of its rarity but because of its unusual size and beauty.

Five years ago it was a young fledgling with a broken wing, in the possession of a Carib Indian. Since that time it has lived in perfect health in Roseau, Dominica, until it was found and purchased for the Zoological Society.

The island of Dominica to which the Imperial Amazon is confined is about midway in

the long chain of Lesser Antillian islets which extends in a wide curve from Porto Rico to South America. North of it is Guadaloupe, with Martinique to the south. It is roughly a flat oval in shape, twenty-five by sixteen miles and very mountainous. As I have passed it going and coming from South America I could clearly discern the high central ridge extending north and south, and sending out numerous spurs at right angles, dividing the entire island into a succession of abrupt hills and valleys.

Thirty-five years ago Mr. Ober wrote a brief account of this bird in its haunts, and since that time but little more has been added to our knowledge of the species. This splendid parrot which the natives call *Ciceroo,* can be found only in the highest mountains where the mountain palm, *gommier or gum-tree, bois diable* and other plants are found, upon the seeds of which it feeds. It is very shy and difficult of approach, and Mr. Ober tells us, "the cry is harsh, resembling the call of a wild turkey. Morning and evening they call one to another for perhaps an hour; during the rest of the day they remain silent, except for an occasional scream. When a gun is fired, they all cry out, and then keep perfect silence. They do not seem to associate in flocks at this season, like the parrot, but are found more often in pairs. They breed in the hollow tops of high trees, and the young are rarely taken. When caught young, they readily learn to talk. It descends to the valleys in the rainy season to some extent, but prefers the mountains. At this time they are very fat, excellent eating, and much hunted."

Mr. Ober made an excursion into their mountain fastnesses and camped on their feeding grounds, but so wild and wary were the birds, that though assisted by Carib Indian hunters, he was able to secure only three, which are now in the National Museum. In later years a new road was opened through the forest and one collector shot a dozen specimens.

Whatever fluctuations may mark the final years of a species, we may be almost certain that in the case of a conspicuous insular parrot such as this, there is small hope of more than a few years' lease of life.

Considered as one of the creatures which man will soon efface from the earth, the Imperial Amazon illustrates an interesting fact. Instead of being spread over a million square miles as was the Carolina parrakeet, this bird is found only on about one hundred and fifty miles of the earth's surface. But isolation in the thick tropical jungle of one small mountain ridge has done more for it than all the advantages which vast northern forests and southern everglades conferred on the parrakeet.

As we have seen how our single northern representative of the order of Parrots has been almost if not wholly exterminated in the United States,* it is worth while briefly to review the present status of these birds in the West Indies. Three distinct groups of parrots formerly inhabited these islands, macaws, Amazons and conures or parrakeets. Of the several species of macaws, not one survives to-day, and whereas formerly, members of this splendid group of birds lived in Cuba, Jamaica, Haiti, Guadaloupe, Dominica and Martinique, all have been exterminated by the inhabitants, the persecution being the direct result of the palatibility of the birds. The last of the West Indian macaws to go was *Ara tricolor,* which lived in Cuba and the Isle of Pines. It was nearly two feet in length, clad in orange, maroon, scarlet and blue. The last specimen was killed forty-eight years ago, and to-day less than a dozen skins are known to exist in museums. As to the other species of macaws we have only the brief, all too imperfect, accounts of early French voyageurs and missionaries.

Thirteen species of Amazon parrots are West Indian, and fortunately only two have already become extinct, although several, like the Imperial Amazon, are almost gone. Six forms occur in the Greater Antilles in extremely diminished numbers; two in Jamaica, and one each in Cuba, the Bahamas, Haiti and Porto Rico. Grand Cayman, far to the southeast of Cuba also has a peculiar species of Amazon. These birds, with their more or less white foreheads are apparently related to the white-fronted Amazon of Mexico and Central America. Starting with the Lesser Antilles and going southward, we find two species of this group of parrots in Dominica and one in Martinique, St. Lucia and St. Vincent. Unlike the more northern forms, these natives of the smaller islands seem to have a South American ancestry, showing a closer resemblance to Brazilian species.

The violet Amazon, closely related to our Imperial bird, formerly lived in Guadaloupe, but we have now not so much as a feather left to us. From descriptions we know that its head and neck were violet or slate-colored, its back green and its wings yellow and red. More than two hundred and fifty years ago it was written of this bird that when it eats cashew nuts its flesh tastes like garlic; if it feeds on *"bois des inde"* it tastes like cloves; if on bitter fruits, it

* The last authentic record is that of Mr. Frank M. Chapman, who, in April, 1904, saw thirteen Carolina parrakeets in the Okeechobee region of southern Florida.

becomes bitter as gall, but when the parrot feeds on guavas it is at its best and then the French commit great havoc among the flocks. In 1779 the violet Amazon had become very rare owing to the terrible war which the French colonists wage on it when it is "fat and succulent." So to-day we can only wish that the birds had adhered to a diet of cashew and bitter fruits!

In Martinique there lived a green Amazon with red cap and tail-feathers, of which an early writer says, "the parrot is too common for me to stop to give a description of it." It has since vanished, leaving not a feather. Mr. Rothschild in his volume on Extinct Birds has collected much of the available data and gives colored plates of these macaws and parrots, reconstructed from the fragmentory descriptions.

The third group is the long-tailed conures or parrakeets which are smaller than the others, and being less conspicuous and valuable as food we find very meagre notices of them among early writers on the islands. Mr. Austin Clark has summed up our knowledge of these birds, and finds that they are at present found in Jamaica, Cuba, Haiti, Porto Rico and St. Thomas, while similar or closely related species have been exterminated on Guadaloupe, Dominica, Martinique and Barbados.

We have had on exhibition in the Large Bird House, no fewer than twenty-three forms of the genus *Amazona,* five of them West Indian.

With our trumpeter swans, whooping cranes, Carolina parrakeets and Imperial Amazon we have the foundation of a collection of extreme interest and value, and one which should attract many visitors to the Zoological Park. As we watch these pitiful remnants of earthly races, we feel like ascribing to them the death slogan of the old Roman gladiators, "*Morituri salutamus!*"

## ITEMS OF INTEREST

### *Mammal Department*

*Moving the Polar Bear.*—Silver King, the big polar bear, is now one of the most contented inmates of the Park. He has entirely abandoned his sullen attitude since his home has been changed from the small den built especially for him, to the Polar Bear Den with its large swimming pool. Having sold the female polar bear, which previously occupied the big bear den, Silver King was moved into his commodious quarters on the morning of April 15. When the big shifting box was placed against his cage he evinced a decided determination to remain where he was, and although we blocked off the sides with heavy oak planks, giving him very little room, he refused to leave his old quarters. A large piece of beef was fastened in one end of the shifting cage, but even this failed to arouse the bear.

It was then decided to try an interesting experiment, by bringing Flip, the walrus, down in front of the den, to see if this would attract Silver King's attention. The walrus is very tame and will follow Keeper Snyder wherever he goes. Waddling after Mr. Snyder, toward the bear den, the walrus emitted a series of grunts and characteristic gutteral sounds which caused Silver King to rear on his hind feet and look with interest on the approaching procession. There was no doubt about the bear recognizing his natural prey of the ice floes. As the walrus passed, he started tearing at the bars.

When Flip was stationed in front of the shifting cage, Silver King thrust in his head and shoulders and gazed at the living bait, with marked interest. Flip was then given a soap box as a pedestal, placed directly in front of the door of the shifting cage. Almost immediately after he had climbed on this, the big polar bear hurled himself in, when the door was lowered behind him. Flip was then led back to his tank, while Silver King followed his awkward gait with longing and hungry gaze.

The shifting cage was soon lashed against the open door of the big Polar Bear Den, and Silver King lost not a minute in entering his new quarters and making a detailed investigation. Men were assigned to watch him all through the day, and a keeper remained all night to observe the bear's actions in his new cage. There was, however, no need of this vigil, as Silver King spent a great part of his time swimming in the commodious tank and appeared to be well satisfied with his new quarters. We anticipated more trouble in enticing him into the steel cage attached to the den where he might be locked in during cleaning time. Silver King made a travesty of our apprehensions by utilizing this shifting den as his sleeping quarters from the start, so the change is in every way satisfactory to this fine animal and to the keepers. In fact, in his new den this redoubtable animal has done none of the troublesome things that we had good reason to expect of him.

*Hybrid Bear Cubs.*—Our visitors have been much amused at the antics of the hybrid bear cubs. The tiny youngsters commenced gambolling around the den with the first warm spring days. Compared with the mother, which weighs 350 pounds, these little bears are ludicrously

small. They are exceedingly playful, and despite their size, stand upon their hind feet and box at each other in true bear fashion.

The arrival of these young bears was attended by unusual condition, as Czarina, the mother of the bears, has for years avoided the sleeping compartments. It was during very cold weather, in January, that we discovered the little bears, which Czarina had huddled in an unprotected corner of the den. Young bears are the most helpless creatures imaginable, and it seemed that we must surely lose them from exposure to the cold. As Czarina would not go into her sleeping house with her helpless cubs, it was a case of building a house over the mother and her litter.

Boards were fastened against the bars at the southwest corner of the cage and a quantity of bedding was shoved into this corner. We then proceeded to house Czarina in by building a roof over her and boarding up the front of the triangle, as there were other bears in the den that might interfere with the youngsters. We made this house strong enough to prevent them from tearing it apart and covered it with planks studded with wire nails. A tar paper, water-proof covering was afterwards added. A small door was cut, through which to feed Czarina, and she appeared well satisfied in these close quarters, where she remained thus confined until early in April, when the young bears were strong enough to withstand exposure to the weather. The front of the house was then removed and late in April the entire structure was taken down. Then it was, during a cold rain, that Czarina decided to shelter her young in the sleeping den, which she entered for the first time in four years.

*Tropical Bears in Winter.*—The South American spectacle bear has successfully passed the winter out of doors. Frederico was inclined to shiver and look uncomfortable at the approach of the really cold weather, so we built a glass extension in front of his cage, of hot-bed frames, and heated the interior of the enclosure with a small oil stove. Under these conditions he experienced no further discomfort. This rare animal will soon be transferred to his permanent cage, which will be the northerly one in the new series of Bear Dens. The other South American bears will be quartered near by. The sleeping dens of these animals will be warmed during the winter months by small electric heaters. R. L. D.

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*Bulletin No.* 6:—Wanted, two copies.

## BIRDS OF PREY AND THEIR AVIARY

*By* C. William Beebe *and* L. S. Crandall

### Part I.

THE Eagles, the Hawks and the Vultures have at last come into their own! The splendid collection of these birds in the Zoological Park, from the great condor of the Andes with his ten foot span of wings, to the tiny Cuban sparrow hawk, are waiting only the coming of May to be installed in their spacious new quarters. No more shall the King of Birds be confined in such cages as happen to be vacant in the Ostrich or the Aquatic Bird Houses; but from now on, all the great feathered, aerial carnivores will have a permanent home of their own in the heart of Bird Valley.

Every one of these birds is of interest; both from the standpoint of the position it has won for itself in life, and from the importance of its relation to mankind. The unconquerable spirit of the peregrine falcon and the golden eagle looks out through their fierce, splendid eyes, revealing that fearlessness in attack upon domestic creatures which turns every man's hand against them; the less fierce but keen, searching watchfulness of the great Asiatic vultures reminds us of the thousands of human lives they save each year in their work as scavengers.

The aviary we shall discuss in Part II; and in future publications the interesting lives of individual species will be taken up in detail, their haunts, their homes, their ways of life and their relation to mankind.

The vultures of North and South America are included in the Order *Cathartidiformes,* while those of the Old World are united with the hawks and eagles of both hemispheres, as *Accipitriformes.* Of the latter group, the vultures form the family *Vulturidae.* Most of these birds feed entirely upon carrion, seldom having the temerity to attack living creatres.

The Griffon Vulture (*Gyps fulvus*) of Europe and northern Africa is, without doubt, the best known, and has been divided into a number of local races or subspecies, each differing slightly from the others, although the name griffon is applied indiscriminately to several of them.

This bird lives in companies in open country, generally roosting on nearby cliffs. While hunting, they soar over the surrounding country at great heights. At the first sight of food, the bird spying it swoops downward, this movement being noted by its neighbors which immediately follow. Thus there is no dearth of guests at the gruesome feast.

Our pair of Griffons, which has been with us for several years, constructs a nest each spring in the straw covering the floor of the aviary at that season. Two white eggs are deposited, although the normal clutch is given as one only. These eggs, unfortunately, have invariably proved infertile.

Greatest in size and most repulsive in appearance of the Old World vultures now represented in the collection, the Eared Vulture (*Otogyps auricularis*) is probably also the most uncommon. The bare skin of the head and neck varies in color from sickly flesh color to blood red, according to the condition and age of the bird. The absence of feathers throws into greater prominence the powerful, hooked beak. The playful and almost jovial nature possessed by many vultures of both the Old World and the New, is well developed in this species. Its greatest pleasure is to strongly oppose the keeper's attempt to clean its cage; striking at the rake with awkward but powerful feet. This vulture is a native of tropical Africa, the birds of Egypt being considered as a separate form by some authorities.

HARPY EAGLE

Perhaps the most maligned of all the *Falconidae* is the Red-Tailed Hawk (*Buteo borealis*). This unfortunate bird is known variously as chicken-hawk and hen-hawk, in reference to its fancied habit of raiding poultry yards. For this reason, the Red-Tail is persecuted continually and shot on every possible occasion by the farmer, in his supposedly righteous indignation. As the bird generally meets its fate while hunting for the destructive mice that swarm about the fields, its end is even more deplorable. And it is while the farmer is about, bent on the destruction of this beneficial creature, that the rapacious Cooper or sharp-shinned hawk spreads swift destruction among his poultry. And it is this same speed that carries the marauder out of danger; often before his presence is known and almost invariably before his species can be determined. Shooters should learn to distinguish bird-killing from harmless hawks, and it is our intention to arrange a series of native species to facilitate the gaining of this knowledge.

The Harpy Eagle (*Thrasaëtus harpyia*) is one of the largest and most powerful of the Accipitrine birds. An inhabitant of the dense tropical forests from Mexico southward, little has been learned of its wild habits. The thickness of its tarsi and the extreme length of its talons testify to the fact that their owner feeds on animals of considerable size, and it is known that fawns, peccaries, sloths and monkeys enter into its bill of fare. The wings are broad and strong, and although the bird appears slow and awkward while moving about its cage, it is said to be able to handle itself with great ease while on the wing. Certain it is, that once its selected

RED-TAILED HAWK

GRIFFON VULTURE

victim has been seized by the great hooked claws, it has small chance for escape.

The nesting habits of this magnificent bird are very little known. It is said to build in the tops of the highest forest trees or on rocky cliffs, the nests being repaired and used year after year. It is sometimes said by the indians that the Harpy lays four or five eggs, the last three serving as food for the eaglets hatched from the two others. This, however, is a very common tale, most often related of those species concerning which the truth is not known, and is probably untrue.

Because of the inaccesibility of their habitat, Harpies are seldom to be obtained and our two fine specimens were secured only after years of waiting.

Of the larger birds of prey of the Old World, probably the best known is the Lammergeyer or Bearded Vulture (*Gypaetus barbatus*). This bird seems to occupy a position intermediate between the eagles and vultures, differing from the latter in its fully feathered head, but resembling them closely in most other points. It probably feeds mostly upon such carcasses as chance brings in its way, but there seems to be no doubt that it kills its own prey on occasion. It is said to be very destructive among the herds of sheep in spring, darting at the lambs as they stand near the brink of a precipice and either pushing them over with the force of the blow or so startling the little creatures as to cause them to lose their balance and plunge downward, when their persecutor follows leisurely to feast. It is from this habit that its German name has been derived.

The Lammergeyer once ranged from Portugal to China, but is now no longer found in Europe, unless possibly in the mountains of the southeastern portion. It is a bird of the peaks and builds its nest in the most inaccessible cavities. The single brownish egg is laid usually in February. The period of incubation and the length of time spent in the nest by the young bird, are unknown.

The Golden Eagle (*Aquila chrysaetos*) is found throughout North America, Europe and northern Asia, varying its habits according to the conformation of the country of its range. Its food consists of live mammals and birds, in the pursuit of which it is very active, when its size is considered. Dead animals, however, are not refused and doubtless form a very considerable portion of its diet.

In North America, this bird is often confused with the immature bald eagle from which it is to be distinguished by its feathered tarsi. In

INDIAN CRESTED EAGLE

BALD EAGLE

LAMMERGEYER

EARED VULTURE

GOLDEN EAGLE

the eastern United States it is not common, but it is numerous among the mountains of the West, where its nest is built on well secluded ledges.

In Europe and northern Asia, the Golden Eagle is widely distributed. This is thought to be the bird used by the Tartars in hunting. The birds are trained as were the falcons of Europe, to pursue and capture game for the benefit of their masters. The eagle is generally carried by a horseman and is kept hooded until game is sighted, when the hood is removed and the leash slipped. The bird at once mounts into the air, and, spying the fleeing creature, dashes off in pursuit, the sportsman following the chase on foot or horseback. The animals most frequently flown at with Golden Eagles are antelopes and sometimes wolves, with which the bird is well able to cope. Pallas states that the value among the Tartars of a well trained bird of this species is equal to that of two camels.

The Indian Crested Eagle (*Spizaetus nipalensis*) is represented in the collection by an immature specimen, for which the adjective, crested, seems somewhat misleading, as this portion of the plumage is very slightly developed in the young. The crown and nape feathers of the adult, however, reach a length of three or four inches and add greatly to the appearance of the bird. This eagle is of somewhat smaller size than the golden, and like it, has the tarsi feathered. It is clad in black, white and sober browns. It breeds throughout the Himalayas and in China and Japan, descending to the warmer plains of India to pass the winter. A bird of the forests, it is seldom seen above the trees and very rarely soars, preferring to lie in wait in some leafy retreat for the hares, partridges and junglefowl which form its prey. The nest is a bulky structure, generally placed in a tall tree, and lined with green leaves; a single egg being laid.

So much has been written concerning the Bald Eagle (*Haliaetus leucoephalus leucocephalus*), our national emblem, that only repetitions are possible in the scope of this article. This is a bird of the air, frequently seen at great altitudes, as it describes graceful circles in keeping watch over its especial territory. It is swift and powerful on the wing, and undoubtedly takes a certain portion of its food by this means. Its principal diet, however, is composed of fish, for which it is mainly dependent upon those cast up along the shore, although it sometimes assumes the role of fisherman. It is well known, also, that the Bald Eagle is not above robbing the osprey of its prey.

The shrill scream of the Bald Eagle is very characteristic and is a familiar note in those localities in which it is of regular occurrence. The voice of the male is said to be distinguished from that of its mate in being more clear and unbroken.

As is usual among Accipitrine birds, this eagle builds its nest in a lofty position, the top of a tall tree by choice, and two or three dull white eggs are laid. The young spend several months in the nest, during which period they are fed constantly by their parents.

The northwestern form of the Bald Eagle is a much larger bird and has been separated from the type as *Haliaetus leucocephalus alascanus*. This subspecies is found in Alaska, Mackenzie, Kiewaten and Ungava, south to British Columbia and the Great Lakes.

NEW YORK AQUARIUM—MAIN FLOOR VIEW.

# GENERAL INFORMATION

## MEMBERSHIP IN THE ZOOLOGICAL SOCIETY

Membership in the Zoological Society is open to all interested in the objects of the organization, who desire to contribute toward its support and are endorsed by two members in good standing.

The cost of Annual Membership is $10 per year, which entitles the holder to admission to the Zoological Park and the Aquarium on all pay days, when he may see the collections to the best advantage. Members are entitled to the Annual Reports, bi-monthly Bulletins, Zoologica, privileges of the Administration Building, all lectures and special exhibitions, and ten complimentary tickets to the Zoological Park and Aquarium for distribution.

Any Annual Member may become a Life Member by the payment of $200. A subscriber of $1,000 becomes a Patron; $2,500, an Associate Founder; $5,000, a Founder; $10,000, a Founder in Perpetuity, and $25,000, a Benefactor.

Applications for membership may be handed to the Chief Clerk, in the Zoological Park, Dr. C. H. Townsend, N. Y. Aquarium, Battery Park, New York City, or forwarded to the General Secretary, No. 11 Wall Street, New York City.

## ZOOLOGICAL PARK

The Zoological Park is open every day in the year, free, except Monday and Thursday of each week, when admission is charged. Should either of these days fall on a holiday no admission fee is charged. From May 1 to November 1, the opening and closing hours are from 9 o'clock A. M. until one-half hour before sunset. From November 1 to May 1, the opening and closing hours are from 10 o'clock A. M. until one-half hour before sunset.

## NEW YORK AQUARIUM

The Aquarium is open every day in the year: April 15 to October 15, from 9 o'clock A. M. to 5 o'clock P. M.; October 16 to April 14, from 10 o'clock A. M. to 4 o'clock P. M. No admission is charged.

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The publications of the Society are for sale at the prices affixed below. Address H. R. Mitchell, Chief Clerk, New York Zoological Park.

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Souvenir Books and Post Cards of the Zoological Park may be obtained by writing the Chief Clerk, New York Zoological Park, New York City.

Publications of the Aquarium may be obtained by writing Dr. C. H. Townsend, Director, Battery Park, New York City.

VOL. XVI. NO. 52 JULY, 1912



# ZOOLOGICAL SOCIETY BULLETIN



Published by
THE NEW YORK ZOOLOGICAL SOCIETY

ARTHUR FREUND 1912

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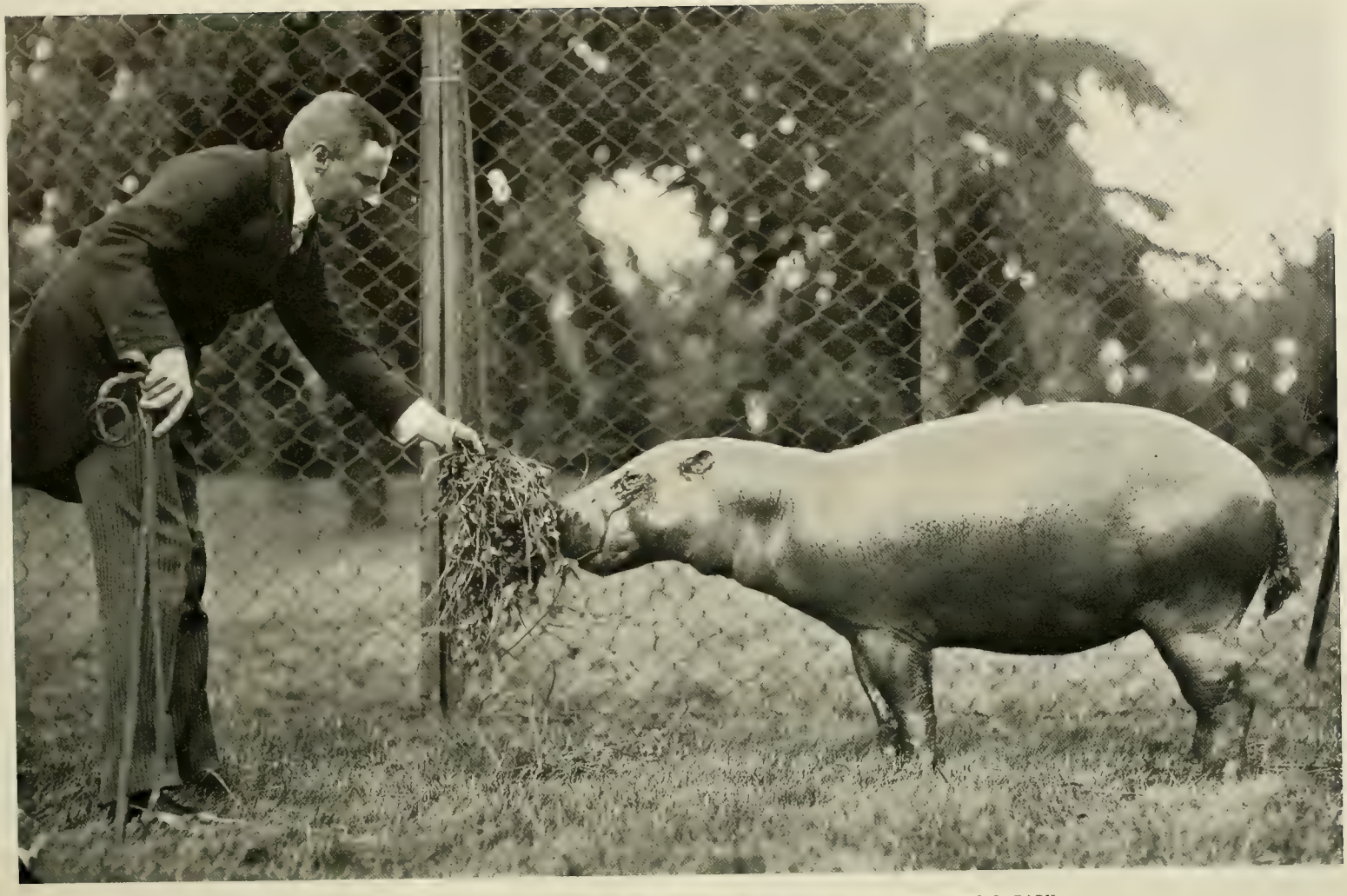

HANS SCHOMBURGK AND THE ADULT MALE PYGMY HIPPO CAPTURED FOR THE ZOOLOGICAL PARK

# ZOOLOGICAL SOCIETY BULLETIN

*Published by the New York Zoological Society*

Vol. XVI JULY 1912 Number 52

## OUR PYGMY HIPPOPOTAMI*

*By* William T. Hornaday

DESPITE all the exploring to and fro in Africa, and all the slaughter of big game that for a century has furiously proceeded, the dark continent has not yet given up all her wild-animal secrets. The wonderful pygmy African elephant (*Elephas pumilio*) stole into the world very quietly in 1905, but in 1889 the far more wonderful okapi burst upon the scientific world like a meteor. Since that astounding animal, the zoologists have been in a mental state of what-next.

The pygmy elephant of the Congo country and elsewhere, "we-have-with-us-to-night," as it were, in the lusty personality of the type specimen, now about fourteen years of age; but thus far the okapi has eluded us. Major Powell-Cotton literally called back the supposedly almost extinct white rhinoceros by discovering in the Lado District an entirely new outcrop of them. For this species we have striven, but thus far without avail.

With the exception of a few museum men, and the few zoologists who are specially interested in the ungulates, the Pygmy Hippopotamus has been to the world nothing more than a name, and to most people it has been not even that. Its discovery was made known to the world in 1844 by Dr. Samuel G. Morton, of the Philadelphia Academy of Science, but with the publication of his papers, the diffusion of knowledge regarding the new species almost came to an end.

Speaking generally, and so far as the standard works on natural history have been concerned, the Pygmy Hippopotamus has been almost as unknown and as mythical as the queer beasts of the visions of St. John the Divine. Touching the literature of *Hippopotamus liberiensis*, we might almost say that there is no general literature,† except a very interesting chapter in Mr. Graham Renshaw's book, "Natural History Essays."

The best way in the world to secure zoological varieties from the remote corners of the earth is by taking pains to provide funds with which to purchase the animals that bold and venturesome men are ever ready to capture and bring out for a price. It is impossible for any zoological park or garden to capture its own animal collections, without becoming a dealer in wild animals—an impossible undertaking.

Eighteen months ago, Mr. Carl Hagenbeck, ever ready to try the untried, and attempt the impossible, despatched to Liberia, west coast of Africa, an intrepid hunter and explorer named

*At the hour of going to press we received from Hamburg, Major Schomburgk's account of the capture of our Pygmy Hippos. It is printed in its entirety, directly following Dr. Hornaday's article.—*Ed.*

†Proceedings of the Philadelphia Academy of Science. Morton in 1844 and 1849, and Leidy (osteology) 1852.

OUR ADULT MALE PYGMY HIPPO

Hans Schomburgk. His mission was to find and secure alive several specimens of the almost mythical Pygmy Hippo. The region which finally had to be penetrated was found to be reeking with cannibals, for whose diversion an imposing company of native soldiers had to be enlisted. Mr. Hagenbeck pithily declared that "My traveller objects to being eaten!"

The travels, experiences and hardships of Hans Schomburgk remain to be related, for the trophies have traveled faster than their history. At the present moment, the public will be most concerned in the fact that the New York Zoological Society has secured the best portion of Herr. Schomburgk's catch—*a living pair of Pygmy Hippopotami!*

The adult male in the case is thirty inches high at the shoulders, seventy inches in length from end of nose to base of tail, and the tail itself is twelve inches long! The weight of this animal is 419 pounds, and all these figures are offered subject to correction.

The female is believed to be only two years old. It stands eighteen inches high at the shoulders, and weighs 176 pounds.

The Pygmy Hippo is characterized first of all by its midget size, which in the adult animal is about equal to that of a twelve-months-old baby hippo of the large species. Its skull is more convex, or rounded, on its upper surface, than that of *H. amphibius;* its legs are longer and more slender in proportion, and its eyes do not "pop" out of its head like those of the giant species. Another striking character is the long tail, which in proportion is about twice as long as that of its only living relative, *amphibius.*

The face of the Pygmy is relatively smaller than that of the large species, which brings the eyes nearer to the median line of the skull. The lower jaw of the Pygmy bears only two incisor teeth, while the large species has four; and while the orbits of *liberiensis* are large, they are proportionally less elevated than those of the large hippo. As the latter swims nearly submerged, the eyes seem to float on the surface of the water like two shiny glass marbles.

The color of the Pygmy is *recorded* as "slaty black" on the back, "sides greenish slaty gray, and under parts grayish white." Pending the arrival of our specimens, we quote this remark-

able color scheme with all reserve, and subject to amendment.

We await with keen interest Hans Schomburgk's account of the habits, and life history in general, of this rare and strange animal. We have been informed, however, that it makes its home in swamps and wet forests, often at a distance of several miles from the nearest river or lake, and that it is not at all dependent upon large bodies of water, as its colossal relative always seems to be. We may confidently expect to hear that it subsists on fleshy and tender plants and reeds, and grass that is not too coarse and tough to be masticated by small jaws.

Regarding the habitat of this animal, we can at present only describe it as the interior of the Republic of Liberia and regions adjacent; a designation not quite so vague as it seems, because Liberia as a whole is not large. We imagine that Herr. Schomburgk penetrated about 200 miles into the interior from the coast, but the awful character of that region would make this equal in difficulty and hardships encountered, to about 500 miles in East Africa. Heretofore it has been known that the species inhabits the Little Scarcies River, St. Paul's River, Du Queah River and Fishermen Lake.

The Pygmy Hippopotamus is, besides its only living relative, a midget, no more. Caliph, the enormous male hippo, who now stands in a mounted state in the American Museum of Natural History, stood four feet, nine and one-half inches in shoulder height, twelve feet and four inches in length from end of nose to root of tail, his circumference was eleven feet and eight inches, and his weight has been given as close to 6,500 pounds. Beside the enormous bulk of a full grown male hippo of the common species, it is like a six-months-old human infant of thirteen pounds weight beside a man of 180 pounds. The disparity in size fairly challenges the imagination. In bulk, one adult male Nile hippo weighing 6,000 pounds is equal to fourteen adult male Pygmy Hippos! Strange to say, notwithstanding the fact that many big hippos have died in Zoological Gardens during the last hundred years, we can not learn that thus far anyone ever has had the enterprise to ascertain the weight of a full-grown male by actually weighing its remains. When our Peter the Great passes from earth, he will be weighed.

Up to this time, so Mr. Renshaw informs us, only one living specimen of the Pygmy Hippo ever has been sent from Africa to Europe. That was in 1873, when one was sent to the Dublin Zoological Gardens, arriving at that institution in a dying condition, and lived there only "about five minutes." Not a single living specimen ever has been exhibited, prior to the arrival of our specimens at Hamburg on June 15, 1912.

The museum of the Philadelphia Academy of Science contains the only series of museum specimens of the Pygmy Hippo now in America, embracing a mounted skin, a mounted skeleton, two skulls, and an unmounted skeleton. The Leyden Museum (Holland) is the only other which can be said to possess a series of specimens. There is one mounted skin in the London Museum and another in the Paris. This, with the mounted skin of the Dublin calf, in the Dublin Museum, completes the list of Museum specimens now extant, of an important species that was discovered and described sixty-eight years ago!

Our unique pair of living Pygmy Hippos will reach New York about July 10, 1912, and will be exhibited in the Elephant House. For their accommodation, a small additional bathing-tank, communicating with their apartment, will be constructed immediately. The cost of the pair was $12,000, and as zoological rarieties they are well worth their cost.

BULL HIPPO CAUGHT IN A PIT ON THE 29TH OF FEBRUARY

GOLAH TOWN ON LOFA RIVER
Three hippos caught near

# ON THE TRAIL OF THE PYGMY HIPPO

## AN ACCOUNT OF THE HAGENBECK EXPEDITION TO LIBERIA

*By* Hans Schomburgk

*Major and Military Attaché, Liberian Legation, London*

"COME to see me at once," was the telegram I received from Carl Hagenbeck, when I had let him know that my projected trip through the French Congo had been abandoned. I hurried to Hamburg to meet our grand old man of Stellingen, who greeted me with these words:

"Will you go for me out to West Africa, to try and capture an animal that has never been brought to Europe alive, and help me to preserve a dying species of the African fauna?"

"Why, certainly," was my reply, "Have I not just equipped an expedition to go to the Western Coast?"

But when he then told me in confidence that I was to go to Liberia, capture and bring back alive specimens of the Pygmy Hippopotamus, I must confess that I hesitated. Here I was asked to catch alive an animal which had not even yet been shot by a European hunter! Prof. Buttikofer, the great authority on Liberia, had tried for years to secure a specimen, and after all he had to be content with the skins and skeletons of three animals that had been shot by native hunters, without himself even having seen a live animal.

During my twelve years of African travel, my motto had been, "Nothing is impossible." I had explored the Wa Lunda country on the watershed of the Congo and Zambesi, without an armed escort, in the face of the evil prophecies of old hands who took leave of us for good when we started on our trip. I had succeeded in bringing home alive the first East African elephant, an undertaking that had been tried by many a well known hunter without success. "Yes," I said, "I will go!"

Six weeks after this conversation I landed in Monrovia, the capital of the Republic of Liberia. Here I was greeted from all sides with the assurance that no such animal as the Pygmy Hippo existed, but only the big Hippo.

Having read in Buttikofer's book that he had obtained a specimen of the Pygmy Hippo on the Duquea River, I decided to give this river the first trial. Unfortunately I arrived just in the beginning of the rainy season. With the greatest difficulty I managed to collect twelve carriers, who, on the promise of extra high wages, agreed to follow me.

In this lot, I must have found the human sweepings of the streets of Monrovia. How they

humbugged me! They evidently thought I was powerless to do anything, and I knew only too well that they would desert on the slightest pretext.

In Sheffeliensville I got the first news of Pygmy Hippos. Mr. Lett, an American mulatto, who had been a hunter with the Buttikofer expedition, gave me the assurance that the Pygmy Hippo existed on the upper part of the Duquea River, while his big cousin, the "Kiboko" of East Africa, only frequented the rivers near the coast. I hired six canoes in Sheffelien to bring me up to Jehtown, six days up the Duquea River.

Rain was the order of the day. In pouring rain we started every morning, and pulled all day long against the current of the swollen river. The second day out, I thought the time had come to teach my carriers a lesson. We were so far from civilization already that I no longer feared desertion.

When I called the boys in the morning to start, nobody came; so I called up my headman, and asked him very quietly if the boys were packing up.

"No," was the reply, "they do not want to start yet."

Without saying another word I took up my Browning automatic revolver, and put seven shots through the roof of the boys' hut. Then they came quickly! From that moment I took the reins; and after I had picked out the biggest and laziest of the motely crowd, and had given him a good hiding, I had no further trouble.

After a month's hard hunting, I at last had the luck to see a Pygmy Hippo. I was drifting down the river in my canoe, late one afternoon, when I saw the animal trying to climb up the steep bank of the river. Before it had noticed us, we were within ten yards. I stood with my gun ready to shoot, but with a great effort I curbed my hunting passion. Carl Hagenbeck's last word had been: "Now, remember! We must have our animals *alive!* Do not shoot before you are sure to be able to catch one." Not five yards from the canoe the little brute dropped back into the water and disappeared.

Shorly after that I returned to the coast and fitted out anew to penetrate into the Golah country. Two months I hunted there without any success. In the rains it was practically impossible to find any tracks; but in spite of everything I managed to find about thirty promising places in which to dig my pits. At first I had the intention to try netting the animals, but the uncertainty of their movements, and the thick undergrowth of the dense Liberian forests, made net-hunting impracticable.

One day a Hippo fell into one of the pits. It had rained for thirty-six hours, and before my scouts reached the place it escaped unharmed! For the first time in my life, I knew myself beaten. Practically all my carriers were sick; the whole country was under water, and the native trails were recognizable only because in them the water raced down like mountain torrents.

I returned to the coast and cabled to my people that the only chances for success were in the short, dry season from January to May. The net result of this expensive expedition was that I had absolute proof of the existence of the dwarf Hippo.

But what Hagenbeck undertakes, he carries through against all odds, and without consideration of financial sacrifices. He had not lost faith in me; and in December, 1911, I started out on my second expedition. This time I was known in Liberia, and had but small difficulties in raising a caravan of fifty good men.

I had seen on the last trip that nothing could be done near the coast, though the beasts exist even within a day of the coast; but there it is hunted too much by the natives, and is consequently too rare and shy.

The confluences of the upper Lofa River were this time my goal. Here, in the practically unknown Gorze territory of the powerful and warlike Golah tribe, near the big Sue Bush, where there is no human habitation for days and days, I could reckon on success.

But again I encountered an unforseen obstacle. The Pesse tribe had declared war, and was fighting the Government and its allies.

Yangaia, a big fortified Golah town, I reached without any considerable trouble, but when I called my carriers the next morning to start, they rebelled, one and all. The previous day we had had a sharp march of twenty-five miles through thick bush. Instead of taking their loads the whole crowd came down to my tent, which I had pitched outside the village, and refused to go on. They said:

"We are tired to-day; and there is war ahead. To-day we will not move, for to-morrow we hold word."

This was all I could get out of them. The whole success of the expedition was in the balance. Had I made them the slightest concession, everything would have been lost. Once more I told them to take their loads, but only a threatening murmur was the answer. Then I saw red, open rebellion! I slipped the Browning in my pocket, took my hunting crop and went among them. Clash, crack went the whip on the

HOWARD RAPIDS IN THE LOFA RIVER, IN THE COUNTRY OF THE PYGMY HIPPO

naked body. A few straight hits from the shoulder on the jaws of those who did not move, and quicker than I can tell it I drove the mutinous crowd before me like a herd of sheep! The result of the rebellion for the boys was that I stopped their rations for three days, and their allowance of gin for a month.

The same day I reached Taquema, the fortified town of the paramount chief of the Golah, Tawe Dadwe. I had reckoned greatly on the assistance of this omnipotent native king, but to my great sorrow he declared openly that he could not help me, because the war pressed him too hard. He even expected an attack from the Pesse daily. Against my usual custom, I had to submit to the entreaties of the chief, and pitch my tent in the middle of the town.

During my stay at Taquema the scouts of the enemy approached the town, but hearing that a white man with a big caravan and guns had arrived, they thought discretion the better part of valor. Here I had an opportunity to study the most secret sacrificial rites of this unknown tribe.

The Lofa River, one of the biggest rivers in Liberia, flows within an hour of Taquema. For two months I hunted on the small tributaries of this river, the course of which will appear entirely different from what it has been thought, when my map of the hinterland of Liberia is finished.

In spite of the greatest endeavors and the hardest work which I have done during my long hunting career in Africa, I did not even manage to shoot one of these shy and secretive animals, in order that I might send home positive proof of its existence.

The greatest difficulty in hunting the Liberian Hippopotamus is that, unlike their big cousins, they do not frequent the rivers. They make their home deep in the inhospitable forest, in the dense vegetation, on the banks of the small forest streams; but, not satisfied with the protection the forest affords them, they enlarge the hollows which the water has washed out under the banks, and in these tunnels, where they are invisible from the bank, they sleep during the heat of the day.

Day after day I patrolled the streams, continually in water up to my hips, frequently to my shoulders. At last, as I was nearly despairing, on the 27th of February, Diana, the goddess of the hunters, smiled on me, and the first Liberian Hippopotamus fell a victim to my gun. It was a nearly full grown cow. I was following the spoor of a small herd of the newly-by-me discovered dwarf elephant, when a fresh track of a Mwe (Golah name for the Pygmy Hippo), made me leave the elephants. I followed this spoor down to a small streamlet with hardly two inches of water, where it led

THE FIRST BULL HIPPO CAUGHT
Photographed in Africa

BUILDING A TRANSPORT BASKET FOR CARRYING A PYGMY HIPPO
Skeleton basket on the left

into one of the above mentioned holes. I sent my boy round, and when he started poking into the hole with a stick, a responsive grunt followed, and not two yards from me the head of the much coveted animal appeared. I still carried my elephant gun. As my shot rang through the forest, one of the rarest animals of the African fauna lay before me.

My camp was far away in the bush, and to my great regret I had to abandon the skeleton. It was only with the greatest difficulty that I managed to skin the animal and have the skin brought by my two hunters to the tent.

In spite of all difficulties, however, I had not given up the idea of catching a hippo alive. Wherever I found a likely place I had a pit dug. It is easy to catch the great East African Hippo, which keeps continually in the same water and uses the same tracks. With the Pygmy Hippo, it is very hard to even find a place where there is the slightest chance of catching one, because this brute roams through the forest like an elephant or a pig, mostly goes singly, though sometimes in pairs, and rarely uses the same track twice.

Meanwhile over a hundred pits had been made by my men, all carefully dug seven feet deep and covered so that not the sharpest eye could detect any sign of danger.

At last, two days after I shot my first animal, and when I was still working on its thick skin, a boy rushed to my tent breathlessly shouting from afar:

"Massa! Massa! Dem Mwe done catch!"

On Nea Tindoa, an inhabited island in the Lofa river, a big bull had fallen into one of my pits. My sergeant, Momoro, started at once with a few boys, to reach the place the same night, and keep guard to prevent the meat-hungry natives from killing the Hippo.

At last I had succeeded! Against the prophecies of Europeans, Liberians and natives! And only a few days before Tawe Dadwe told me: "It is impossible to catch a Mwe! It has never been done, and they have only been shot after they have been caught in the pits. They are too dangerous. Many a hunter has been killed. You white men know a lot, but here you are trying something that is impossible."

Early the next morning I reached the place. Before night a fence had been built around the hole, and the animal was let out. It was a beautiful full-grown bull, in the prime of his life.

Nothing succeeds like success! Six days after that, the second one was caught; this time a two-year-old cow. A week later, the third, a young three-quarter-grown bull was taken. Now I had three animals, at three different places. Macca, where the little cow was caught,

CARRYING A PYGMY HIPPO
Hippo transport passing through a village

I decided should be my central collecting station; and we started to bring the animals there.

Now the real trouble commenced. The Golah people refused to carry them! For the big animals, I needed at least forty men each, to cut roads and carry.

Had it not been for the unselfish assistance I had from the Liberian Government, which had appointed me Major on the Geographical Staff, I never would have been able to bring my expedition to a satisfactory end.

Nobody can imagine the enormous difficulties of the transport of those heavy animals, which we had to carry in self-invented native-made baskets, through the roadless hinterland of Liberia. From the farthest place inland, where I caught three animals, it took me, even after the men had cut the roads, twelve days to reach the first river on which I could use boat-transport to the Coast.

A native king, Gongzoo, had, on the promise of a big present, promised carriers for the first animal caught in his district, but when I asked for the men, he point blank refused! By that time I had put the Hippo in a basket, and had brought it with my own carriers, under the most frightful difficulties, to his town. It was a matter of getting men from him, or standing the chance of losing my hard-won animal.

I tried a bluff, with only my sergeant for support. I arrested the chief in the middle of his own town, kept him in front of my revolver, loaded all my guns, put them before me on the table, and declared war provided the men were not forthcoming within two hours. It succeeded. When the people saw their king a prisoner, the men came. What would have happened if they had accepted my challenge, I do not know!

After I had got the first three animals to my central station, and handed them over into the charge of one of Hagenbeck's most experienced keepers, I returned to Monrovia, to arrange all about the further transport, and to meet my wife, who had come out to join me, and to put the experience which she had gained during an eight-months horse-back ride through the hinterland of the Cameroons, into the services of Hagenbeck.

Shortly after we had returned to Macca, another big bull and a youngster were caught; and then it was high time to return to the coast, before the rains should set in and make the country impassible. His Excellency, President D. E. Howard, very kindly put soldiers at my disposal, to assist me in collecting sufficient carriers.

After I had managed to tame a full-grown Mwe, the natives feared me so much that I succeeded in collecting 150 men in three days. While Mr. Moltmann, the keeper sent by Hagenbeck, and I hurried ahead to arrange for the food for the animals, Mrs. Schomburgk superintended the transport, as it was absolutely necessary that one European should keep an eye on the carriers so that they did not drop the heavy baskets on the uneven and partly-mountainous trails.

At last we had reached Japacca, and could put our poor, ill-treated animals into proper cages, which had been sent out from Hamburg.

Now our greatest troubles were over. The animals were in good condition and feeding well, so that we could expect to get them safe to Hamburg. But another trouble arose. When we got to the coast at Cape Mount, we were prophecied a bad sea for the first of June, the day the steamer *Alexandra Woermann* was to call for us. But even then our luck did not desert us. Certainly with difficulties, but without mischief, we shipped our valuable cargo. In the Bay of Biscay we had stormy weather. The ship rolled heavily, but the animals did not seem to mind it.

The enormous expenses of these two expeditions can easily be imagined when one considers that in Liberia everything has to be carried. Great quantities of trade goods are necessary to procure food for the carriers, and also as presents for the native chiefs.

Fortune has again been kind to Hagenbeck's colors. For forty years attempts had been made to bring these animals to Europe; and we had succeeded. The greatest satisfaction to me, however, was when I had the honor to be presented by Mr. Hagenbeck to His Majesty Kaiser Wilhelm II, when he visited Hagenbeck's Animal Park, at Stellingen, on the 17th of June, where he congratulated me on my success.

ZOOLOGICAL SOCIETY BULLETIN

Departments:

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W. T. Hornaday.

*Reptile*
Raymond L. Ditmars.

*Aquarium*
C. H. Townsend.
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*Bird*
C. William Beebe.
Lee S. Crandall.

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Elwin R. Sanborn, Editor.

Vol. XVI. No. 52 JULY, 1912

## THE LAND OF THE "FREE"

The care that people bestow upon property other than their own, is the truest index of their thrift and character. Generally those who are in the most straitened circumstances have but slight conception of the value of their possessions, and are just as proportionately careless with the property of others. In some cases they are merely indifferent and thoughtless. Then there is another class that is wilfully malicious and destructive. It is a positive delight for them to steal and commit all sorts of other depredations when they are not under observation.

If the forest lands of the Park were opened wide for a single Sunday, the damage resulting could not be made good in an entire year. Every bush and shrub would be reduced to a naked skeleton, if any remained at all, and every tree might well tremble for the safety of its lower branches. It may be a noble thought to commit the peoples' parks to "the care of the people," but those who would scorn the responsibility are altogether too numerous. A great many of the visitors to the Park on Sunday, or any other day, have not the slightest desire to exercise their privilege in a decent and conscientious manner.

The disorderly ten per cent. move across the landscape like a blight, and the trail of debris in their wake is the testimony of their contempt for law and order. It is sad enough when the responsibility is carelessly or thoughtlessly laid aside, but when the human impulse is purely malicious, it would seem that the vaunted "cradle of liberty" sometimes turns out human documents that do not recognize the difference between liberty and license.

On a warm Sunday in June, two of the Park benches near the Elk House were occupied by a large family or several persons. To mention the nationality would be to assail us with the pride of 2,000 years of bigoted ancestry; so we will call them Americans. As rapidly as they ate their luncheon, just so rapidly was the ground strewn with egg-shells, fruit-skins, papers, boxes and tins. One of the keepers passing, went to the great pains to bring a debris can to the spot and compel the visitors to clean the place thoroughly and put the rubbish into the can. Later in the day he returned to find that the little party of pleasure seekers had carefully overturned the can and scattered the contents in every direction over the ground, littering the place, not only with their own garbage, but that of perhaps a hundred others who very decently had the care of the grounds on their minds.

There are times when "liberty" is so grossly abused that it becomes a curse to decent citizens, and we often see that result in the Zoological Park. E. R. S.

## NEW MEMBERS

April 4, 1912, to June 6, 1912

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THE EAGLE AND VULTURE AVIARY
Photographed from the roof of the Zebra House

# THE BIRDS OF PREY AND THEIR AVIARY

Part II.

*By* C. William Beebe and Lee S. Crandall

THE Eagle and Vulture Aviary is situated just north of the new Zebra House and forms the sixth and southernmost link in the chain of bird exhibits which extends throughout the length of Bird Valley, the others being Cope Lake, the Duck Aviary, Flying Cage, Crane Paddock and Aquatic Bird House. The permanent home of the raptorial birds is a true outdoor aviary consisting of thirteen large flying cages, ranging from those twelve feet square by fifteen high, intended for the smaller hawks, to the great center flight cage, twenty-four feet square and rising to a height of thirty-two feet. Each cage has a domed concrete shelter in the rear. The twelve years of experience gained in housing these birds in the outside cages of the Aquatic House, and also in the Ostrich House, has furnished an abundance of suggestions for the details of construction.

Already it is evident that the new installation will be satisfactory in every respect. Aside from actual adaptability to the requirements of the birds of this group, an aviary such as this must be made pleasing to the eye of the visitor; and in constructing a long row of wire cages this is always a difficult matter. It was a happy thought of Director Hornaday to bend the entire front into a sweeping segment of a circle. Thus, while from the great height of the flights the extent of the exhibit as a whole is clearly evident, no long, hard, straight lines appear, and as the visitor moves along, cage after cage is revealed around the gently curving front in a way which precludes all appearance of monotony.

Another factor, purposely introduced to break up the monotony of a straight running front, is the irregularity of the cages both in height and in size. The photograph makes this clearer than can any description—the largest cages, terminal and central, being separated by two intervening groups of smaller size.

The framework of the new aviary consists of two-inch metal pipe, with the innovation of being split, each half bolted on separately, so that the concealed attachments of the wiring can in time of need be exposed with but little trouble. The wire itself is all of electric weld, the mesh of the partitions being one by four inches to avoid any possibility of injury from birds fighting in adjoining cages. The flights intended for small hawks have wire mesh one inch by twelve, while the mesh of the seven great eagle

KING VULTURE

and condor cages measures three by twelve inches—so open that at a few yards distance the wires become almost non-existant to the eye.

As to house furnishings, the birds of prey are well provided for. There are generous tanks of clear fresh water for drinking and bathing, firm, round perches of wood for the hawks and eagles, flattened ones for the condors, at different heights, carefully arranged in relation to each other, in order to facilitate flight from the lower to the higher ones, while at the same time interfering as little as possible with the general flying area. Tall stubs of trees provide a variety of perching places, and piles of boulders will soon be furnished to those species which haunt barren rocky mountains.

The need of this aviary may be appreciated when it is stated that on the very first day of installation every cage was filled with the twenty-eight species of eagles, hawks and vultures which have heretofore had their homes in various odd cages of the bird collection.

After life in their rather cramped quarters it was good to see the birds—bald eagles, harpys, condors, and all the others, stretch their wings to the widest and flap easily up to the first perches and then to the highest, twenty-one feet above the ground. It took but a few minutes for the birds to settle down and as most of them were taken as fledglings from the nest, this new allowance of liberty will meet their utmost desires.

Beneath the domes of the concrete skeletons, low perches provide protection from rain and storm for the birds which desire it. Access to the cages is gained through sheet-iron doors at the back of each shelter. These doors are well in harmony with the general solidity of the structure and preclude all possibility of draught. The flooring has been given careful thought. Unlike the conditions which obtain in the cages of all other groups of birds, sand is a very unsatisfactory flooring for birds of prey. It often adheres to the moist food of these birds and when swallowed becomes a menace to their health, so coarse gravel has been used instead and is proving a perfect substitute. The meat and dead animal food such as rabbits, guinea pigs and other rodents may be placed anywhere upon the floor of the cage without danger of becoming sandy and unwholesome. The gravel may be cleansed with a hose in a few minutes and the well-drained floor will leave the cage sweet and clean.

Although the very name of vulture stands for noisomeness and ill odor, these birds prefer fresh, untainted food, and in captivity will touch none but the cleanest and best they can get! As a result, our vultures are free from disagreeable odors, and their plumage is as clean as that of a thrush. In amiability and good nature they far excel their fierce and more dignified relations the hawks and eagles. The sanitary conditions are as welcome to these erstwhile scavengers as to any of the other inmates.

The New World Vultures, forming the Order *Cathartidiformes,* were described in BULLETINS No. 31 and No. 32, and only cursory mention will be undertaken here.

The Condor (*Sarcorhamphus gryphus*) of the Andes, is becoming a very rare bird in captivity. It is being slaughtered for its "quills," for millinery purposes. Fortunately, it is most tenacious of life, and our old male which arrived on November 30, 1899, is still with us, after a

SOUTH AMERICAN CONDOR

DUCK HAWK

period of nearly thirteen years. He now has as cage mates, a pair of younger specimens, with which he keeps on terms of armed neutrality.

The King Vulture (*Gypagus papa*) is a South American bird, the scarcity of which is nearly equal to that of the condor. This is a remarkably handsome bird and the brilliant coloration of our two specimens seems strangely out of place among their sombre neighbors.

The Black and Turkey Vultures of North and South America, are divided into two subspecies each, all being represented in the collection. The North American Black Vulture (*Catharista urubu urubu*) is distinguished from the South American form (*Catharista urubu brasiliensis*) chiefly by its larger size. The South American Turkey Vulture (*Cathartes aura aura*) is not only much smaller than the North American bird (*Cathartes aura septentrionalis*) but differs also in the proportions of its head and bill, the former presenting certain peculiar bony processes not found so highly developed in *septentrionalis*. These vultures all are of great interest because of their high economic value as scavengers.

The Orange-Headed Vulture (*Cathartes urubutinga*) is undoubtedly closely related to the turkey vultures but is coal black in body color and the bare parts of the head are brilliantly colored with pale orange, pink and greenish black. These birds appear to be as particular in their feeding habits in the wild state as their congeners are voracious, and are said by the natives to take only the choicer parts of such food as they may happen upon. It certainly is true that this species is greatly outnumbered by the turkey vultures, at least in Guiana, and is much more solitary in habit. In captivity, it is shy and delicate and will not be allowed a sufficient supply of food if confined with other larger birds.

The California Condor or Vulture (*Gymnogyps californianus*) is one of the finest and certainly the rarest of all the birds of prey of North America. Uncommon as this Condor is, however, two young specimens have found their way to the Zoological Park in recent years, one in 1909 and the other in the following year. We now have three individuals of this fine species, old "General" having been in the collection since 1905.

The Audubon Caracara (*Polyborus cheriway*) is, in a way, a link between the hawks and vultures. It hunts much upon the ground and probably feeds mostly upon carrion, but nevertheless is well able to catch and kill living prey when occasion offers, as evidenced by the sharpened talons.

The genus *Buteo* is represented in the collection by four species — the Red-Tailed Hawk (*Buteo borealis borealis*), the Western Red-Tail

AUDUBON CARACARA

(*Buteo borealis calurus*), the Red-shouldered Hawk (*Buteo lineatus lineatus*), and the European Buzzard (*Buteo buteo*). These birds are similar in habits, feeding mostly upon mice and frogs, and are of great value to the farmer.

One of the finest of the eagles is the Australian Wedge-tail (*Uroaëtus audax*), somewhat similar to the Golden in general appearance, but much more tawny in body color and lacking the feathered tarsi. Now that the importation of live birds from Australia is no longer legal, it will doubtless be difficult to secure specimens of this eagle.

The American and Ferruginous Rough-leg Hawks (*Archibuteo lagopus sancti-johannis* and *A. ferrugineous*) are now represented in the collection by several specimens each. Both possess feathered tarsi, the former presenting several plumage phases. These birds hunt mostly in the twilight, beating their way across the fields at a short distance above the ground. The owl-like appearance of the bill and gape, particularly in the Ferruginous, are very striking, and the resemblance is increased by the fact that it bolts mice and sparrows practically whole, as do the owls, and does not tear them to bits as is the habit of most hawks.

The Sea Eagles are represented by two species —the White Breasted (*Haliaëtus leucogaster*) and the Vulturine (*Gypohierax angolensis*). The former is closely related to the bald eagle and has much the same feeding habits. Both of these birds are found near the Eastern oceans, where the highly poisonous sea-snakes form a great portion of their food.

One of the fiercest and most predatory of American *Accipitriformes* is the Duck Hawk (*Falco peregrinus anatum*), so swift on the wing that it is able to overtake the fastest flying ducks. The European subspecies (*Falco peregrinus peregrinus*) is the Peregrine Falcon, the favorite hawk of the days of falconry, and as the two forms are separated only with great difficulty, if at all, it is safe to attribute to our bird all of the qualities of strength and courage which gave the "Noble Peregrine" its name.

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## ZOOLOGICAL PARK NOTES

### Bird Department

*Gulls that Perch.*—The readiness with which birds adapt themselves to the changed conditions of captivity is well demonstrated by some of the smaller gulls in the Flying Cage. While it is true that these birds may sometimes perch when flying at liberty, it is far from a common occurrence. The laughing gulls, brown-headed gulls and a short-billed gull have developed a fondness for alighting on the slender cross-bars which join the sides of the cage close to the top. Here the birds spend most of their time, calling as vociferously as though on their native sands.

*Prolific Water-fowl.* — Breeding operations among the birds are now under full sway. Two pairs of herring gulls are incubating their eggs in one of the enclosures of the Goose Paddock. A number of young Canada geese are following their parents from one pond to another, while tiny mallard ducklings fairly swarm on the various bodies of water. The white call-ducks have three sturdy youngsters a month old which, as the parents are full winged, are apt to be seen almost anywhere within the Park limits. The wood ducks have been remarkably prolific. No less than eighty-eight eggs of this species, with probably a few of those of the Mandarin intermixed, have been removed from the nest boxes and entrusted to the solicitous care of sitting hens. About twenty ducklings have already been hatched, and with a fair share of good fortune, our flock of this lovely species should be greatly augmented by fall.

*Nesting Owls and Vultures.*—The eggs of the giant eagle owls and the griffon vultures have, as usual, come to naught. Those of the owls met with a mishap when just at the point of hatching, and were found broken at the bottom of the cage. None of the many eggs of the griffon vultures have ever proved fertile, but it is to be hoped that in the liberal confines of the new aviary better results will be obtained.

*Cereopsis Geese.*—The most important event of all is the successful hatching of five sturdy goslings by the cereopsis geese. The little birds are much stronger than those of two years ago and are growing rapidly. A temporary fence of fine-mesh wire has been placed across the Crane Paddock, giving the geese a large space at the southern end well supplied with grass. As this is only the second time that birds of this species have been hatched in this country, as far as known, much interest attaches to the occurrence.

*The Owl Cages.*—Now that the eagles and vultures have been removed to more commodious quarters, their former abodes are available for their smaller relatives and the owls. The dainty sparrow hawks, of which we possess four species, are now ensconced in two large out-door cages on the western side of the Aquatic Bird House, where they can enjoy a degree of liberty never before within our power to give them. The other cages of this series are occupied by our extensive collection of owls. L. S. C.

FEEDING THE YOUNG HOODED SEALS
From a photograph made in the Zoological Park

YOUNG HOODED SEALS IN THE ZOOLOGICAL PARK
When feeding time arrives the young seals are very alert. They watch for the keeper in a very intelligent manner.

# THE HOODED SEAL OF THE NORTH ATLANTIC

*By* Harry Whitney

EXCLUSIVE of the walrus, there are five distinct species of seals inhabiting the Atlantic waters contiguous to northeastern America:—the Harbor or Ranger Seal (*Callocephalus vitulinus,* Linnaeus), a small coastal breeding seal which frequently ascends fresh water streams; the Ringed Seal (*Phoca hispida, Schr.*), also a small coastal breeding seal; the Harp Seal (*Phoca gruenlandica, Fabr.*), somewhat larger than the two preceding seals, and, unlike them, breeding upon the north Atlantic ice floes; the Bearded or Square-Flipper sometimes called the Big Seal (*Phoca barbata,* Fabricius), a very large seal, breeding along the northern coasts; and the Hooded or Bladder-Nose Seal (*Cystophora cristata,* Erxleben), which, like the Harp Seal, gives birth to its young upon the winter-formed ice floes of the north Atlantic.

The five young seal pups which I brought from the north in May, 1912, and which are now in the New York Zoological Park, belong to this last species, and a brief description of the species, its habits and its economic value, may be of interest to the readers of the Bulletin.

In size, the Hooded Seal ranks second to, and sometimes rivals, the Bearded Seal, which is classed as the largest of the Atlantic seals. A full grown Hood "dog" will not infrequently measure from eight to nine feet in length, and tip the scale at one thousand pounds, while an old female Hood will often weigh between eight hundred and nine hundred pounds.

In color, the adult is bluish-black on the back, with a belly usually of lighter shade, varied with paler spots, though sometimes the belly is of a light-grayish tinge, with darker spots.

The male has a muscular sac or bag extending from the nose backward to the center of the head. This bag may be inflated at will, forming a hood-like covering to the head. It is this hood which gives the species its name.

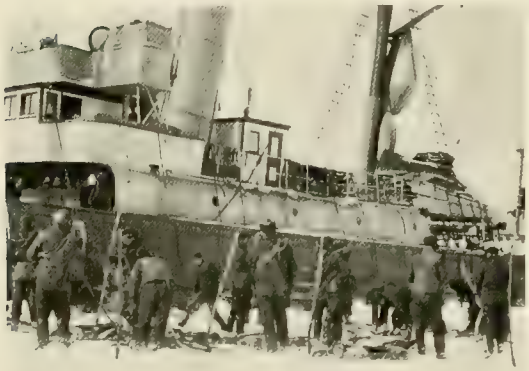
The Hooded Seal has one other distinctive feature. While each of the other four species mentioned has six front teeth or incisors in the upper jaw and four in the lower jaw, the Hooded Seal has but four above and two below.

Both males and females will attack their enemies with boldness and savage ferocity, and in all my experience I have never encountered a more determined or dangerous antagonist among wild beasts than an angry Hooded Seal brought to bay. I have seen an old dog Hood seize a gaff between his teeth and chew it into splinters. They travel upon the ice with remarkable speed, and the hunter must always be alert, prepared to meet their vicious charge.

Hood pups are nursed by their mothers until about two weeks old, when they are left to forage for themselves. After capturing the five little pups now in the Bronx Zoological Park, and taking them aboard our ship, the *Neptune,* I was confronted with the difficulty of securing proper food for them, and it occurred to me to examine the stomachs of the carcasses of several of the old ones which had been killed. To my surprise I found that all I examined contained perfectly fresh herring, and in nearly every instance the fish were whole and entirely free from injury, without a tooth mark or scratch. From a single one of the old dogs I secured in this way six large fish. It is claimed that the seal herds off the Newfoundland and Labrador coasts destroy more codfish and herring each year than are taken by the entire fishing fleet.

The Hooded Seal is migratory in its habits. During the summer the greater herds are found along the southeast coast of Greenland. In February and March they appear in countless numbers on the winter-formed ice floes off the Labrador and Newfoundland coasts, both in the open Atlantic and in the Gulf of St. Lawrence.

HOODED SEALS ON THE ICE



BRINGING THE SEALS TO THE "NEPTUNE"

HOODED SEAL AND YOUNG

It is at this time that they give birth to their young upon the floes, where they are found in families consisting of the mother seal, her pup and two or three old males. I have seen few instances where a seal gave birth to more than one pup in a season.

The pup is a shapeless, furry, steel-grey ball when first born, but grows and assumes shape with truly wonderful rapidity. It is safe to estimate that it increases three or four pounds in weight in each twenty-fours hours during the first eight days after birth. The stormier the weather and the more snow that flies, the better it thrives.

The Hooded Seal attains its full growth in four years, and competent observers state that they begin breeding at that age.

It sometimes happens that large herds become imprisoned upon the floes, through long continued winds in one direction which raft the ice and cut off their retreat. When this occurs and the seals are long exposed to the strong rays of the sun, their skins burn and crack, and they are subject to intense suffering. When in this condition, at times when the ice parted, permitting them to again return to the sea, I have observed them jump clear of the water, giving bellows of pain that could be heard for a long distance. When the skins are thus burned they are valueless, and the animals are not molested by the sealers.

The value of the Hood, and, in fact, all species of north Atlantic hair seals, lies in its hide and blubber. The hide is tanned into leather, and the blubber converted into oil. From its hide, wallets, traveling bags and other fine leather goods articles are manufactured. The oil is utilized in many ways. It has even been said that no small proportion of high grade seal oil which finds its way into the Italian market, passes through a process of deodorization and refinement and is launched upon the market by the resourceful Italian as "olive oil."

Sealing has long been one of the most important industries of the Colony of Newfoundland. The seal fishery, it is said, had its beginning early in the eighteenth century, and the records of the Newfoundland Board of Trade state that as early as the year 1742, Fogo and Twillingate reaped a profit of nearly three thousands pounds sterling from trade in seal oil.

In the early days sealers went to the ice in sailing craft, but in 1862 the *Bloodhound* and the *Wolf,* the vanguard of the present large fleet of sealing steamers especially fitted for the work, were introduced, and a new era in seal hunting began. It is the object of the sealers to find the floes upon which the herds are located, and this done, old and young alike are slaughtered upon the ice. Late in the season, after the young have taken to the water, a sealing steamer will sometimes follow a large herd at full speed for a hundred miles, or until the herd, becoming exhausted, takes to the ice floe again for rest. When thus thoroughly wearied they will not at once return to the water, and are spoken of as "beat out." After a long drive of this kind they are very poor, and large lumps form under each flipper.

The harp, the one other species, as previously stated, which whelps upon the ice, though a much smaller seal than the Hood, is more valuable, and is found in much larger herds than the Hood. The young of this species is snow white until two weeks old, when it sheds its first coat and assumes a dark slate color.

The seal hunt was at its zenith in 1831, when 686,836 seals were captured. In 1911 the total numbered 304,591. Captain Abraham Kean, with the *Florizel,* captured the largest number of any one ship during that year, his catch reaching a total of 49,129, of which more than half were harps.

*Condition of the Great Apes.*—With the exception of occasional colds and bronchial troubles, our family of great apes is in good condition. The animals have passed through the winter without serious illness, except the chimpanzee known as Little Dick. This unusually vigorous animal has several times broken his legs during his rough play, and but recently came from the hospital where he had been retired with a dislocated knee. A new exhibition is being prepared, in which the apes will further demonstrate their mental capacity. The orang-utans, Mimi and Mike, are now nearly adult. These creatures appear to possess the strength of two men, and while both are good natured, are at times inclined to be stubborn. They are very destructive, and our repair men are kept almost constantly busy on the iron work and trapeze bars of the cage.

R. L. D.

ADULT HOODED SEAL

HOODED SEAL
The flippers are turned under when moving around

HOODED SEAL AND YOUNG
The sealer *Neptune* in the background

MALLARD DUCKS

## ZOOLOGICAL PARK NOTES

*Albino Alligators.*—Through the interest and courtesy of Mr. George L. McVey, the Reptile House possesses five albino alligators. So much of the coloring pigment is lacking in the skin of these reptiles that they are of a pinkish white hue, while the eyes are very pale, though apparently as sharp and alert as those of any normal saurian. These little alligators were captured near Miami, Florida. They are now about nine inches long, lively and healthy, and indicate a disposition to rapidly develop.

*Giant Spiders.* — The collection of giant spiders of the tropics is of marked interest. Some of our examples have been exhibited considerably over a year, and all of them have spun intensely white silk tubes in their cages. These spiders regularly shed their skins. When the old skin is about to be cast it splits up the back, the spider withdraws its legs from the original casing, leaving the former covering so intact as to appear like another spider. The keepers have several times been deceived in cleaning the cages by cautiously poking aside the shed skin of one of these creatures, while the living inmate of the cage was actually hiding in its silk tunnel.

*A Long-Lived Beetle.*—Although the small insects are supposed to live for comparatively short periods, we have an interesting record of a beetle that was captured on the borders of the Sahara Desert by a lady visiting the Pyramids. This lady picked up the beetle and placed it in what she believed to be an air-tight tin box; her intention being to have the insect mounted upon arriving in America, as a souvenir of her trip to the desert. She believed that the insect would die immediately after being placed in the box. Arriving in America three months later she discovered the box in her trunk, and upon opening it was astonished to find the beetle, which had been all this time without food and water, in a lively condition. She presented the insect to the Society, asking that it be installed in one of the cages of the Insect Collection. This creature died on April 10 of the present year, after having been in our possession for seventeen months. Curiously enough, it was seldom noted to partake of food during the period it was exhibited here, although it remained uniformly lively up to the time that it died.

*Bushmaster and Lancehead Snakes.* — From Mr. R. R. Mole, who sends us many interesting South American reptiles and insects, we have just received a fine example of the fer-de-lance and a large specimen of the South American bushmaster. These two serpents represent the deadliest species of reptiles of the new world. The lance-head snake is about six feet long and the bushmaster is about eight feet in length. The latter is of a beautiful salmon hue, the body crossed by sooty-black bands. The scales are so rough as to suggest the surface of a pineapple. In his letter relating to these serpents, both of which were captured on the Island of Trinidad, Mr. Mole explains that the great pit vipers of that island are now becoming very rare, owing to the activity among their numbers of the indian mongoose, which was imported to Trinidad some years ago. Despite its habit of killing poisonous snakes, the mongoose is not rated as a very valuable mammal in Trinidad, owing to its habit of frequently killing poultry.

*New Tigers Arrive.*—A fine pair of young Bengal tigers has been placed on exhibition at the Lion House. The male was born in 1910 and the female is a year older.

*New Monkeys.*—The happy family in the south lobby of the Monkey House has been

increased by the addition of a hamadryas baboon, two long-armed baboons, two golden baboons, six rhesus monkeys, six common macaques and two mangabeys. A new type of spring board has been constructed and placed in this cage. This spring board is about twenty feet long, very elastic and supported on studs at both ends. On it the monkeys take much vigorous exercise, some of them bounding about six feet into the air, to the great amusement of our young visitors. R. L. D.

*A Strange Nestling.*—One of the white call-ducks established her nest in one of the mule deer shelter houses. There are four deer quartered there that make use of the house at night; but in spite of this, the duck bravely held to her post. A few days before she left the nest, Keeper Quinn observed a small, furry ball peeping out from under her wing, and upon close inspection was astonished to see—not a duckling—but a very small kitten! The duck resented any attempt on his part to approach closely, but gave no heed whatever to the little tramp. The kitten was thriving as best it could without food, but its pitiful attempts to nurse were so pathetic that we took it from the nest and carried it to the Reptile House, where it was fed and cared for. How it ever found the nest is a mystery. If it had been thrown into the range, there was yet a long distance for it to travel to reach the house, and it was so small and feeble that even this was a Herculean task.

*Flip.*—Our walrus, "Flip," is thriving and growing. In the last few months he has gained fifty pounds in weight and is apparently determined to join the class of animals that have lived and are going to live out the limit of their natural longevity in the Park. Keeper Snyder has devoted a great deal of care to maintaining Flip in fine condition, and the young walrus repays it, both by being healthy and having an abnormal fondness for his keeper. Some members of the *Pinnipedia* are well known for their remarkable intelligence, and Flip is bright beyond the ordinary range of pinniped wisdom.

If his food is not forthcoming according to the fixed schedules, he makes known his wants by tumbling his food-pan end over end along the rocks, making a continuous racket until some one comes. If irritated he barks like a sea-lion, but expresses pleasure with a number of softly modulated grunts. When the hood seals are fed, he is always a curious observer, and then uses his softest voice to attract the attention of the keeper. Should the man leave without noticing him, he barks lustily and dashes into the pool to show his great displeasure. He follows the keeper about like a dog, readily climbs a flight of stairs, and descends with the greatest ease, without the slightest uncertainty.

The water in his pool is artificially maintained at the same salinity as the sea, and is evidently a potent factor in the general good health of the animal.

*Young Hood Seals.* — Mr. Harry Whitney, who has just returned from a trip into Arctic waters on a sealer, has presented to the Park five hood seal pups. One end of the crocodile's summer pool has been filled with salt water and the youngsters installed there. Although but a trifle over two feet long, they possess tiny, sharp teeth, and an entire willingness to use them if any familiarity is attempted. In pulling themselves up on the rocks, the front flippers are bent so that the seal really walks on the ends as they curve under. When annoyed, they express their irritation by growling very much like a dog. Only three are feeding regularly.

*Moving the Bears.*—The new Bear Dens are at last ready, and are being occupied as rapidly as the intended inmates can be moved. The dens fill a long-felt want. All the bears can now be brought together, and the cages that they have occupied in various other buildings can be devoted to the specimens for which they were intended. Inasmuch as many of the tropical bears require heat in the cold months, an ingenious electrical heating plant has been installed in this new series. The compartments requiring heat have been covered over, and the cage fronts fitted with glass. Each sleeping den for the South American and Malay sun bears is provided with an electric plate warmer, fastened against the outer wall.

*Gavial from the Ganges.*—For the second time in the history of the Park, we have a gavial. This time the specimen is of good size. The gavial is interesting because of its habitat—the Ganges and Jumna rivers of India, and its striking form. The very long, thin snout is like the handle of a frying pan. The time was when the gavial sometimes played a part in some of the religious rites of the Hindus. It is recorded that in times past the Hindu mothers did not hesitate to throw their tiny babies into the Ganges, as an offering to the God of the river. It is a fact, however, that the inhabitants of the Ganges-Sumna region do not hold the gavial as sacred, for it is a matter of record that in 1877 Director Hornaday collected twenty-five specimens, great and small, without precipitating any trouble with the natives.

*A Lizard Flying Cage.*—A big yard with sand and grass, a pool of water, and the privilege of basking in the warm sun should warrant a con-

HUMAN PROFILE ICEBERG
Photographed in June, 1909, off the entrance to the harbor of St. Johns, Newfoundland, by V. S. Chapman, of Newark, New Jersey

tented and quiet collection of lizards. But it does not. Hitherto the lizards have regarded their domain as too small and persisted in leaping the fence. While the hot days of summer last, the escaped lizards do very well, but as the cool autumn nights herald the approach of winter, the escaped lizards suffer accordingly, and before they can be recaptured, sometimes become hopelessly chilled, and do not survive long. To prevent further escapes we are constructing a long run entirely covered with wire mesh. In this the lizards may climb, but any leaping will be limited, and escapes are positively barred.

*A New Cheetah.*—A new cheetah has been added to the collections of the Lion House, a big specimen this time, and a very friendly one. These friendly animals are valuable because they feed well and usually live longer than the nervous individuals. There is, in the new arrival, no highly-strung nervous temperament to become disarranged, with a consequent loss of appetite that must be coaxed back to normal conditions. This specimen has evidently been trained for hunting, as he may easily be led about on a leash. The collection of the Lion House has never before been so large, or so varied, and has never before contained so many handsome animals.

*Playful Snow Leopards.* — The two snow leopards living in the big central outside cage of the Lion House are the liveliest cats that we have ever had. They are not only constantly moving around, but seem abundantly good-natured. In captive animals this is a valuable asset. The keepers enter the cage at cleaning time, on a perfectly amicable basis with the leopards; they perform their duties, and retire without causing the slightest disturbance. Even good-tempered animals are sometimes greatly annoyed by the presence of human beings, and often inflict injuries either upon themselves or their keepers, purely through nervousness. These beautiful animals regard any unusual proceeding with perfect equanimity, and play, eat or sleep in the most systematic manner.

*Gunda's Tusks.*—Animals with tusks and horns devote a great deal of their time in wearing them down, and in a good many instances, entirely destroying them. The elephants are particularly gross offenders. An elephant is always examining locks, bolts and bars, to the detriment of his tusks.

The little pigmy elephant, Congo, splintered his tusks so badly that it was necessary to have special brass castings made to fit the ends; and sometime before, Gunda, becoming irritated at Keeper Thuman, chased him from the corral, incidentally ramming the fence and knocking six inches from the end of one of his tusks. To prevent further fractures, Gunda also will be compelled to wear brass castings.

*Primate Kindergarten.*—The daily exhibition of our great apes dining and performing other man-like feats, has been strengthened by the addition of some school-room work. A small blackboard has been introduced, and several of the apes are able to grasp a piece of chalk and make rough marks with it. It is exceedingly difficult for an orang or chimpanzee to use the ends of the fingers upon a small object. The chalk is held against the palm of the hand, opposite the thumb side, by the bent-in fingers. In this fashion the marking is rather awkwardly managed. Susie is by far the most expert. She goes to the board, pulls the cover down, takes the piece of chalk and marks on the board, then very soberly and even precisely places the chalk back in the groove and pushes the cover into place. Susie is a very versatile and apt pupil. When Keeper Engelholm utters a few words in a conversational tone, she readily understands.

*New Sea-Lions.*—The big pool on Baird Court once more resounds with the cheerful note of the sea-lion. Early this summer the bottom

INDIAN ELEPHANT GUNDA

BEAR CUB AT LIBERTY

of the pool was raised three feet, to economize water. The pool is now easier to empty and to clean, and the change in no way detracts from the swimming possibilities. The present inhabitants are exceedingly active, and furnish plenty of excitement for the visitors that constantly gather around.

*Musk-Ox Herd.*—Because a musk-ox looks as round and sleek as a Jersey cow, it does not necessarily follow that it is just as fat. If the musk-ox is amiable and allows one to approach closely enough to stroke him, the investigator would be astonished to find under the long, silky outside hair, a thick covering of the finest wool, at least two inches thick. During the cold that prevails in our New York winters, this covering is at its best; but as the warmer days approach, the wool is shed out, leaving the musk-ox in the lightest of summer covering. To all appearances his pelage is just as abundant as ever, and in consequence the animal is an object of much speculation by visitors as to the extent that he is able to endure the heat. Thus far this season Keeper McEnroe has collected from five young musk-oxen about twenty pounds of wool, and there are as many pounds yet on them. It could be converted into excellent clothing, as it is as fine and delicate as the best wool of sheep.

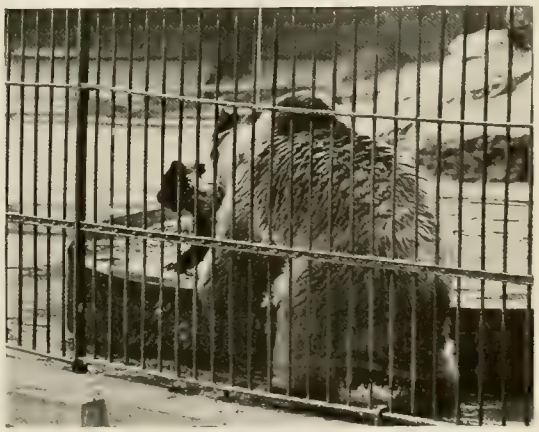
*Wild-Horse Colt.*—If there is special significance in being born on Sunday, our herd of Prjevalsky horses is destined to become famous, for all of the births in that family have occurred on that day. The latest foal arrived on June 9, 1912, early on Sunday morning. The total is now five specimens, three of them born in the Park.

*Births.*—Six elk, two axis deer, three sika, a barasingha and four red deer, besides three buffalo calves have been born into the herds this season. Only by constantly selling the rapid increase have we been able to prevent the herds from overflowing the various ranges. Were it not that our fine surplus is in constant demand, we would be confronted by serious problems in overstocking.

*Bob-White.*—The quail covey that spent the winter in the Park disappeared as mysteriously as it came. Not a sign nor a sound announced the departure of the quail, and it was generally concluded that these shy birds had been frightened away for good. Unless some human voice is deceiving us, however, the very sweet calls, "Bob-white! Bob-white," that recently have floated through the woods of Beaver Valley would indicate that these interesting birds have not deserted the Park. In fact, the chances are that breeding operations are under way.

*A Lively Bear Cub.*—One of the little bear cubs born to Czarina possesses the faculty—which seems inherent among bears—for finding every nook or cranny worth while trying for an escape. He succeeded in getting through an opening in the overhang not over six inches wide. When captured he made a very noisy resistance and aroused his mother to the extent that the keepers could not open the gate of the den to put him back. Accordingly he was loosely wrapped in burlap and lowered into the bathing pool; his mother promptly rescuing him. All openings large enough for a small Raffles bear to squeeze through have been closed.

*Shouting Pea-Fowl.*—The peacock is the paradox of the avian world. To display his gorgeous plumage upon any and all occasions is apparently as agreeable to him as it is to the observer. But there is a thorn for each rose, and a voice for each peacock. While the proudly strutting bird



HIS MOTHER RESCUED HIM

OUR HERD OF PRJEVALSKY WILD HORSES AND THE LATEST ARRIVAL

is a delight to the eye, his voice is equally as great a nightmare to the musical ear.

Under ordinary working pressure, the Park does not produce sounds of sufficient intensity to provoke the discordant protest of the pea-fowl, but the heavy blasting of the rock in the workshop yards is evidently a powerful incentive. As each charge of dynamite is fired, every peacock accepts the challenge and hurls his raucous voice along the line with redoubled intensity. To those who are familiar with the aftermath, it is the rule to hear the blast, and await with bated breath the inevitable pea-fowl chorus.

*Robber Sparrows.*—If the English sparrow had the divine faculty of reading the human mind he might be the vainest of birds. No other creature in the world attracts so much attention as this independent little tramp. Every rascally trait has been foisted upon him; and yet, in winter our streets and parks would be very cheerless without his optimistic chirping. The sparrow is a born optimist and no one can deny that he is not aggressive and self-reliant. When every food supply of our feathered migrants is closed tight in the grip of winter, this brave little fellow starves and freezes with Pickwickian cheerfulness, until the advent of another spring. He is no exception to the rule that the virtues of every creature are properly balanced by their defects. But why condemn him for so valiantly upholding with all his sturdy courage the motto of the "early bird"? The busy bee is not in the running with the sparrow. There are no limits to the ingenuity he is called upon to employ in earning his daily bread. To him it is distinctly a case of a survival of the fittest, and his hereditary birthright of Spartan-like bringing-up has endowed him with a resolution that is not to be denied.

But for all the canny devices to which he resorts in the daily struggle for existence, the following clever trick would scarcely seem believable, had I not known the observer's veracity to be unquestioned.

The favorite hunting ground of the robin, when there are nestlings eager for food, is a smoothly-clipped lawn after a warm rain. Then the earth-worms come to the surface and are easily captured. Under these conditions a robin was observed hopping about, looking for food. A number of sparrows were also apparently similarly engaged. Finally the robin located a worm, seized it and gave a lusty pull. The worm resisted the tugging and stretched like a bow string to a length of about six inches. Suddenly a sparrow darted over, caught the worm midway between the ground and the robin's beak and flew triumphantly away with it. This operation was repeated several times by the sparrows remaining, and the robin at length gave up in despair, and departed to a locality where there was no competition and highway robbers were less numerous. E. R. S.

# GENERAL INFORMATION

## MEMBERSHIP IN THE ZOOLOGICAL SOCIETY

Membership in the Zoological Society is open to all interested in the objects of the organization, who desire to contribute toward its support and are endorsed by two members in good standing.

The cost of Annual Membership is $10 per year, which entitles the holder to admission to the Zoological Park and the Aquarium on all pay days, when he may see the collections to the best advantage. Members are entitled to the Annual Reports, bi-monthly Bulletins, Zoologica, privileges of the Administration Building, all lectures and special exhibitions, and ten complimentary tickets to the Zoological Park and Aquarium for distribution.

Any Annual Member may become a Life Member by the payment of $200. A subscriber of $1,000 becomes a Patron; $2,500, an Associate Founder; $5,000, a Founder; $10,000, a Founder in Perpetuity, and $25,000, a Benefactor.

Applications for membership may be handed to the Chief Clerk, in the Zoological Park, Dr. C. H. Townsend, N. Y. Aquarium, Battery Park, New York City, or forwarded to the General Secretary, No. 11 Wall Street, New York City.

## ZOOLOGICAL PARK

The Zoological Park is open every day in the year, free, except Monday and Thursday of each week, when admission is charged. Should either of these days fall on a holiday no admission fee is charged. From May 1 to November 1, the opening and closing hours are from 9 o'clock A. M. until one-half hour before sunset. From November 1 to May 1, the opening and closing hours are from 10 o'clock A. M. until one-half hour before sunset.

## NEW YORK AQUARIUM

The Aquarium is open every day in the year: April 15 to October 15, from 9 o'clock A. M. to 5 o'clock P. M.; October 16 to April 14, from 10 o'clock A. M. to 4 o'clock P. M. No admission is charged.

## PUBLICATIONS

The publications of the Society are for sale at the prices affixed below. Address H. R. Mitchell, Chief Clerk, New York Zoological Park.

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Souvenir Books and Post Cards of the Zoological Park may be obtained by writing the Chief Clerk, New York Zoological Park, New York City.

Publications of the Aquarium may be obtained by writing Dr. C. H. Townsend, Director, Battery Park, New York City.

Vol. XVI. No. 53 SEPTEMBER, 1912

# ZOOLOGICAL SOCIETY BULLETIN



Published by
THE NEW YORK ZOOLOGICAL SOCIETY

ARTHUR FREUND 1912

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# ZOOLOGICAL SOCIETY BULLETIN

## CONTENTS FOR SEPTEMBER

RHODODENDRON PLANTING NEAR THE ITALIAN GARDEN


# BEAUTIFYING THE ZOOLOGICAL PARK

*By* Hermann W. Merkel
*Chief Forester and Constructor*

THE planting of any zoological park of magnitude presents the same problems and needs as those of other parks, with several others that are due to zoological considerations. Much additional planting is necessary, and some of the planting, which all rules of landscape architecture demand, is not possible on account of the inexorable demands of the animal kingdom, as opposed to the possibilities of the vegetable world. For example, many an ugly corner could be hidden by shrubbery if the animals would only refrain from eating such planting; and many a fine natural vista could and would be preserved were it not for the necessity of having the animals and shelter houses and shade trees necessary to a zoological park. Lakes and ponds would teem with aquatic plants if they did not teem with predatory wild ducks and geese; and the Cranes' Paddock would be a fine smooth lawn if the cranes did not consider it their life work to discover what the grass roots look like. Therefore, a compromise instead of perfection in design often is the only thing possible in a park or portion of a park where wild animals are kept for exhibition.

The writer has yet in mind the mental picture that he had made of the ultimate appearance of the interior of the Flying Cage, and the effort that was made to obtain that ideal. Lotus and papyrus were waving in the summer breeze, showing off to perfection the vivid red of the flamingo and delicate rose color of the roseate spoonbill. Bamboos and banana plants, cannas and great palms were affording nesting sites and shelters for the herons and ibises. Cormorants and pelicans were harmlessly diving and sporting among water-lilies that matched the gorgeous hues of the mandarin ducks. The great Victoria regia spread its immense leaves for the support of the dainty gallinules and egrets.

So far so good. Everything was provided and planted to produce this picture; the birds were awaited and peace reigned supreme.

The great day came. The birds were turned loose, and—but let me draw a veil over the record of the next agonizing day and night. To the credit of the winged destructors I will add that we did recover, perfectly uninjured and as good as new, several palm tubs and flower pots. So much for what might have been.

In planning the planting of the New York Zoological Park, the Executive Committee and its advisors early adopted a definite policy, and has adhered to it as strictly as possible through-

WESTERN APPROACH TO BAIRD COURT
Rhododendrons and German iris

out the progress of the work. This policy was to preserve as nearly as possible the wild character of the park, to establish an adequate boundary shelter, to provide sufficient shade in all corals and along all walks, and to confine all formal planting to the immediate vicinity of the large buildings and to Baird Court. The general result appears to have given general satisfaction.

All of the planting in the Zoological Park may, like omnia Gallia of old, be divided into three parts, according to its primary use, namely: shelter or protective planting, shade planting and ornamental planting. On the south and west the Zoological Park is bounded by streets that are or ultimately will be occupied solidly by large apartment houses, which if not shut out will obtrude most unpleasantly into all the views from within, as do even now, by reason of their higher ground, certain existing buildings that in some instances are two or three blocks distant. This prospect called for the great border plantations which extend from West Farms at 182d Street, at the southeast corner of the Park, to Pelham Avenue and Southern Boulevard, the northwest corner, being in length 1,400 feet, and in width from 30 to 250 feet.

In order to have this border effective in winter as well as in summer it was determined to use conifers to the largest extent possible; and over 5,000 of these evergreens were planted. White pine and hemlock predominate with about 750 plants of each, the remainder being white, balsam, Norway, oriental, Douglas and Colorado spruces, silver fir, Nordman's fir, red and white cedar, Austrian pine, Norway pine, pitch pine, Scotch pine and others. Wherever possible this great belt of evergreens was fronted by a planting of flowering or berry-bearing shrubs, such as arrowwood, highbush huckleberry, snowberry, witch hazel, sumacs, cornels, pepper bush, etc., of which about 12,000 were used. All of this planting has done exceedingly well, some of the white pines making an average annual growth of over 30 inches. In a way this border plantation has formed a great nursery; and many of the fine evergreens now seen at the Concourse and elsewhere have been transplanted from the borders.

Besides forming a shelter belt and wind-

WESTERN APPROACH TO BAIRD COURT
Various species of iris are planted here

break, this great mass of evergreens and shrubs make an ideal home for nesting birds. Our feathered friends have not been slow to take advantage of it, and may often be seen feeding in great numbers on the berries of the various shrubs. It is a fact that it is often impossible to obtain seed from such plants as the highbush huckleberry, arrowwood and black-haw, because the birds get ahead of the men.

This year the border planting was augmented on the south by a row of Norway maples on 182d Street, which, for the most part, is elevated considerably above the Park itself, and consequently will show off the planting to great advantage.

Only those acquainted with the ground before 1904 can realize that all of our planting required an immense amount of preparation in the way of draining and filling. While it is true that some years must elapse before the evergreens will arrive at perfection, no one will dispute the fact that even now the border planting is a conspicuous and welcome feature, and of very great advantage to the Park.

For the shade plantings along the walks and roads, and in the various corrals and ranges, deciduous trees were, of course, used in most instances. Preference has always been given to American trees of a permanent character, such as the oaks, the elms, ashes, etc. As many varieties as possible have been used, so as to present all the types that are available. It must not be understood that no quickly growing trees were planted, for we have not hesitated to use poplars, box elder and soft maples wherever shade was needed at once. In nearly every instance, however, permanent trees have been set in close proximity to the others, so that the temporary trees will not be missed when they are finally removed.

Except in two cases, that of Audubon Court and Baird Court, straight lines were carefully avoided, and all the trees were spaced so as to give ample opportunity for their full development. The importance of ample spacing is, unfortunately, often overlooked, and more private and public parks have been spoiled by planting too closely than by not planting enough.

No special attempt was made to introduce a great number of foreign species, but all of the

hardy American trees that will live have been or will be used and labelled, as we already have done with the native trees adjacent to walks and roads.

No less care was taken to give all of the trees planted an adequate amount of good soil. On Baird Court, for instance, a trench four feet deep and sixteen feet wide was filled with good soil, giving each tree nearly thirty-eight yards of soil; and in addition a cast-iron grating four feet by eight feet surrounds each trunk, preventing the packing down of the soil, and admitting air and moisture to the roots. The flourishing condition of the elms on Baird Court attests that the money and effort were not expended in vain.

In corrals and ranges it is very necessary to protect every tree with a substantial guard strong enough to withstand the attacks of whatever animal the enclosure may contain. That this is not a simple matter in the case of a bison that can strike a blow of as many foot pounds as a locomotive, or a giraffe that can reach seventeen feet or more, may readily be imagined.

The purely ornamental planting is both formal and natural in character as the occasion demanded. Of the formal planting, that of the Concourse and Italian Garden is, of course, the more important and consists, broadly speaking, of four large flower beds edged with boxwood and separated by grass walks. These are flanked by large masses of evergreens that rise from the low-creeping forms of mughus and dwarf white pine near the center, to the towering specimens of American cedar thirty feet in height. Great numbers of European and American pines, cedars, junipers and thuyas in all their horticultural forms and variations were used with charming effect. In front and below the Italian Garden the same effects were obtained in a larger way by using Japanese holly as a hedge, and large specimens of evergreens on either side of the three flights of steps that lead to the garden. Fronting the conifers and gradually blending into natural woodland are masses of hybrid and native rhododendrons in all the gorgeous colors of their kind, reinforced with various lilies. Leading from the Concourse to the entrance is a broad avenue, which, like Baird Court above the garden and Pelham Parkway below the entrance, is planted with American elms. Altogether the Concourse, Approach and the Italian Garden form a park entrance not approached in either dignity or grandeur by any other park entrance in New York.

Semi-formal in character is the perennial and shrubbery border in front of the new Eagle and Vulture Aviary. This is formed of two great masses of planting, divided by shrubs of the best kind into a number of hardy herbaceous perennial beds, presenting all that is best, newest and beautiful in hardy poppies, phloxes,

MADONNA LILY

CONIFERS ARE AS DECORATIVE IN WINTER AS IN SUMMER

POOL IN BEAVER VALLEY IN MIDSUMMER
Completely surrounded by ferns and rhododendrons

GERMAN IRIS

sunflowers, asters, etc. This planting was done late in the spring of 1912 and will not show to good advantage until next year. Another interesting bit of planting is the iris and lily groups on either side of the west approach of Baird Court where American, Asiatic and European irises, which have so aptly been named the poor man's orchids, maintain a succession of blooms until July, later taken up by the lilies.

Of the informal or natural planting the best example is found in the woodland walks of Beaver Valley from the Buffalo Entrance to Baird Court. Here also we have worked with a definite aim in view, to restore an originally beautiful forest that had been trampled and picked bare of almost every native wild flower and fern into the best conditions that protection and care would have shown. Thousands of

NORTHERN END OF BEAVER VALLEY
Rhododendrons cover the banks and various species of water lilies fill the pool

RHODODENDRONS

native rhododendrons, azaleas and rhodoras were planted. Leucothœ, Andromeda were brought from North Carolina, and yellow root, yew and wild flowers, such as wake-robin, bloodroot, snakeroot, violets, anemones, hepaticas and hundreds of ferns were spread under the great oaks, beeches and tulip trees, until now these plants, and others like dog's-tooth violets, spring beauty, jewelweed and wood asters which came back with protection alone, make a trip to the Park well worth the while. Farther south, along this same walk, is a magnificent mass of mountain laurel covering the whole east and north side of the hill occupied by the Rocking Stone Restaurant. Of these glorious plants, only a dozen or so broken and stunted specimens were found when the Park was taken over by the New York Zoological Society; though an abundance of stumps showed clearly that it had been a permanent feature in the forest before

MOUNTAIN LAUREL NEAR THE POLAR BEAR DEN

BORDER PLANTATION OF CONIFERS IN 1905

fire and marauders did their deadly work. Now over 4,000 fine thrifty bushes from three to six feet high delight the eyes of visitors as they approach the Lydig Arch.

On account of the poisonous nature of the foliage of the mountain laurel and rhododendrons, none have been planted near the enclosures of the ruminants, as visitors might easily break off branches and feed them to the sheep, etc., with bad effect. The low wet ground opposite the Rocking Stone Hill has been planted with magnolias, the fragrant blossoms of which perfume the air for a great distance.

Another ornamental planting that may well be mentioned is the rose groups from the Buffalo Range to the restaurant. On the slope facing the upper bison corrals is an interesting lot of seedlings, showing an intermixture of *Rosa rugosa, Rosa humilis* and others, several of them of horticultural value. Above these and around the base of the Lydig Arch is a great mass of memorial roses, and west and north of these, two groups of Multiflora and ramblers and prairie roses. All of the varieties of roses mentioned are of value, not only on account of their flowers, but also because of the winter food supplied by the bright red rose hips, and the excellent protected nesting sites which the thorny tangle affords.

We have planted many shrubs that are useful in attracting birds, such as buckthorn, red and black chokeberry, black haw, arrowwood, maple-leaved viburnum, kinnikinnick, several cornels and many others.

Fortunately we have always had at hand an abundant supply of good fertilizer and mulching material, and the writer has never been stinted by the Director in the sinews of war necessary to care for this vast planting material, nor has he hesitated to use men or money when the occasion for extraordinary effort was required. For instance, in 1905 when our 12,000 newly planted trees and shrubs were endangered by a drought of seven weeks, permission was obtained from the Water Department to use the fire hydrants surrounding the Park, and a number of men working in relays, sometimes all night, through watering and mulching succeeded in keeping the losses down to one and one-tenth per cent., though over 5,000 of these plants were large conifers.

Again in 1912, when the shortage of water caused the Department of Water Supply to issue an order that no city water should be used on the grounds, a gasoline engine and pump, quickly purchased and set up on the banks of Lake Agassiz, saved the situation.

THE SAME PLANTATION OF CONIFERS IN 1912

To others who are considering the planting of a zoological park, our failures in this direction may be as interesting as the successes, and especially two instances which come to the writer's mind. The first one was the combination of water birds and rhododendrons. It would seem that these two, both loving water, would agree perfectly, and for that reason the center island of the Goose Aviary was planted with rhododendrons. In spite of great care and several trials the plants have always died, undoubtedly on account of the great amount of lime voided by the fish-eating birds. The second combination that failed to work was that of squirrels and crocuses, and similar bulbous plants. On the lawn of Audubon Court we planted thousands of crocus, scillas, snowdrops, etc., but there are now but very few left. The gray squirrels, of which hundreds make their home in the Park, followed the planters closely, and worked early and late until every bulb had been dug up. The bulbs were not eaten at once, but unearthed, the sprout bitten out, and the remainder replanted for future use.

In spite of these and various other setbacks, however, the planting in the New York Zoological Park, as a whole, is more than satisfactory. It may be said that the Zoological Society has accomplished its aim, and carried out its original plan of making the Park an attractive recreation ground, filled with the beauties of nature, where the jaded mind of the busy city dweller may find entertainment, peace or serious study, as he is inclined.

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*Young Pea Fowl.*—Several of the pea fowl have succeeded in rearing their young this season; a matter of considerable import, as the peacocks attract the attention of the visitors as much as any of their wild contemporaries. Coming upon an old hen and her young upon one of the walks, I attempted to photograph her. This proceding she completely frustrated by circling around her young or flying directly at me whenever I approached within a radius which she evidently regarded as the danger line. She was not at all anxious to fight, but showed not the least timidity in making an attack. The young ones in the meantime were constantly running about in pursuit of insects, and seemed to have the most sublime confidence in their parent's ability to ward off any danger. So far she seems to have been eminently successful, for the young and mother were taking food from a group of visitors but a few days ago. E. R. S.

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Elwin R. Sanborn, Editor.

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## THE CASE IN HAND.

Some time the layman will understand that wild animals are dangerous. Some time he may learn that to safely approach an animal on terms of familiarity it is necessary to have a knowledge of the habits of the animal. More important than all else, some time he may learn that when he exercises any selfish privileges, or insists upon giving the public a treat by stepping over the rail and putting some creature through its paces, that he places the men in charge of these animals in serious danger. The visitor can make even a friendly animal dangerous, and thereby render the old adage, "familiarity breeds contempt," the very personification of truth. Any large animal approached on a basis of familiarity is thereafter in the dangerous class.

No living man can absolutely know the curious freaks of temperament that are constantly passing through the brain of wild animals, and after some of them have been pampered and petted by would-be animal trainers, the men who are compelled by their every-day tasks to come in contact with their various charges are liable to be sacrificed.

Any stranger who enters a corral, steps behind a railing or in any way places himself in a position that will bring him close enough to afford an animal the opportunity to do harm, is not only courting danger for himself, but is paving the way for possible future injury of the keeper. A man that takes advantage of the fact that he can secure an inside privilege, may rest assured that in "petting" large animals he is preparing trouble for the keepers; and incidentally he may inadvertently subject the officers of the Park to criticism.

It is time for visitors to call a halt, and allow the officers and keepers of the Zoological Park, who are compelled to handle vicious animals, to work out their own salvation in their own fashion.

Kindness to animals is all right up to a certain point, but carrying it beyond the danger line is nothing short of folly. For months after the male Indian elephant, Gunda, came to the Park, I visited him daily, invariably provided with sugar, some peanuts, or other bit of food that he particularly liked. He became so well acquainted with me that by whistling in a peculiar way he would come to me from any point in his yard or shelter. One day, after he had secured my offering of sugar, he launched a terrific blow at me with his trunk with deadly intent. It was a lesson that bore fruit. I never tried it again. And yet to protest with a visitor for leaning over a guard rail and presenting his hand to the teeth of a bear is to draw down upon the keeper a most indignant protest.

My work brings me constantly in contact with various animals, and, after years of observation, I have reduced it all to one line of thought: what are we going to do to each other? It is fairly possible for the man to judge, but not so with the animal. The animal is always nervous, and the tension is quite likely to carry him either in the direction of maiming himself or the man. If he is nervous to the point of fear, then the sympathy is all with the animal, and the sooner he is left to his own resources the greater the display of humanity. If he is bold and displays no timidity, the danger then points directly to the man in the case.

To the keeper of a wild animal, the location of the danger point may be diagnosed very accurately by knowledge that can be gained only by long experience. When the keeper is not absorbed with the care of a third party, his chances are at their best. If, on the other hand, there is a stranger present, the keeper is burdened with the care of the stranger and himself. The stranger does not care what happens to the animal as long as he himself is safe, and the risks are, therefore, doubled; the animal is the direct sufferer for the time being and the keeper in the end. Gunda has been for years a center of interest. Because he can throw back his head at the beck and call of every man, woman and child while they heave all kinds of food into his eager throat, and chase up and down the fence in a rage when he is tormented, he has become a great attraction.

If the responsibility for accidents could be placed where it belongs, there would be fewer accidents. Some of the people with hearts overflowing with the milk of human kindness ought

to realize, if they do not, that when they pet and feed any captive animal they are liable to ruin its disposition. How many of the men who spend a part of their time in the Park on Sunday afternoons baiting the bull elk Stanley until he charges the fence to the breaking point, would dare go into the corral to feed or care for him? Not many; but someone must render this service.

Gunda is like the majority of men and women. He has moods. He has his good qualities, and his bad ones are not improved, either by ceaseless baiting or misdirected attention from people who imagine that he never gets a meal. Man cannot serve two masters, nor can an elephant. It would be an idle thought to ascribe the entire responsibility for Thuman's accident to outside influences, but it would remove all doubt if there never had been any. E. R. S.

## TRANSPORTING WILD ANIMALS

*By* Raymond L. Ditmars

FEW of our visitors realize the time and labor consumed in moving animals from one cage to another. Such operations are frequent, and, in an institution such as the Zoological Park, where many visitors are near by, every precaution must be taken to prevent the escape of an animal. This work always demands ingenuity, and no two operations are quite alike. On an average, our work involves the removal of one animal a week, and we are rather proud of a record that shows a general absence of escapes and casualties.

It must be considered that to successfully maintain a record of this kind there must not alone be ceaseless vigilance in inspecting the many cage doors and the multitude of locks securing them, but operations relating to the removal of heavy and dangerous animals from temporary cages to permanent quarters must be most carefully planned.

Of all animals to be moved, the greatest precaution must be exercised with the bears. These animals are not only powerful, but ingenious in seeking and working at weak places. A bear will test every board of a temporary chute leading into the shifting cage. It will work at the fastenings of the shifting cage; seek to force its fore feet through any openings that may appear large enough, and rock and endeavor to upset the shifting cage. Hence it will be understood that in moving a large bear a considerable amount of planning and construction work is necessary. The shifting cage must be placed upon a strong platform constructed by efficient carpenters; in fact, the general arrangement in placing the shifting cage must be practically as strong as the permanent caging for the animal.

In moving large cats it is not necessary to adopt the elaborate precautions involved in shifting a bear. Lions, tigers and leopards are powerfully built and vigorous animals, and they become highly excited during shifting operations, but while they may tear wildly at corners or small openings, there is no ingenuity displayed in their furious attacks, nor do they seek weak points and concentrate their attention upon such places. Thus, in moving a big cat animal, a simple, hastily built staging holds the shifting cage against the door of the animal's quarters, the transportation cage is roped in position and the animal run in. This latter part of the operation may appear to those not familiar with the erratic habits of captive animals as comparatively easy.

It is during this very process, however, that many hours may be consumed in caging a frightened or stubborn animal. The writer remembers instances where it required days to induce a bear to enter a shifting cage, and the animal went in only after all kinds of enticing bait had been placed before it. It had been prodded and coaxed and forced forward by heavy planks run through the bars, and then was observed by a man who had been left on watch to walk quietly in of its own accord.

It is often quite as difficult to induce a newly arrived animal to leave the travelling cage which it has occupied since it left its native land. Frequently it is impossible to force an animal out of its travelling cage through the door of its permanent quarters, and in such instances it is necessary to remove a panel of the door of the permanent cage in order to bring the travelling box inside. Once inside, the door of the travelling box is again opened. In a day or two the animal decides to prowl about its new quarters. Then an opportunity must be awaited to trap it in the sleeping den, lock it inside, again remove the panel of the main cage and take out the travelling cage. The writer remembers a stubborn snow leopard that arrived late in the afternoon and was lashed against the open door of its new home. We worked until dark endeavoring to coax the animal out of its stuffy travelling cage, but it clung in such tenacious fashion that our labors continued well into the night.

Many of the smaller carnivores must be captured in nets, as they cannot be coaxed into a shifting cage. This refers to the wolves and foxes, and the greater number of the inmates of the Small-Mammal House. Some of these animals are so nervous that to capture them with a

LIFTING A CRATE FROM A SHIP'S HOLD

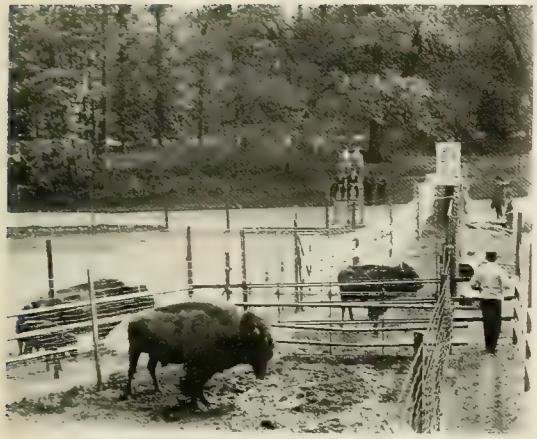
net is liable to cause convulsions. From such attacks they recover slowly, or perhaps not at all. For animals of such intensely nervous disposition, we prepare a trap door in the shifting cage, securely fasten food at the end of the box, and regulate the door to drop when the animal grasps the morsel inside. Many of the small carnivores, particularly the wild dogs and the foxes, prefer to starve for days before making an attempt to obtain the meat in the improvised traps.

In moving hoofed animals altogether different precautions are taken. In this work our planning is directed more toward crating the animal without injuring it. The deer and antelope are naturally timid animals and become greatly excited when they note anything unusual about to take place. The mere sight of a crate sends them scurrying to remote corners of their ranges or corrals. For the heavy stock, like the bison, we have long runways or chutes, into which the animal may be run, when section gates are successively closed behind them, finally forcing them close to the crate. With such an arrangement we crated fifteen bison in two days' time. It is, of course, impossible to construct such runways in all of the deer ranges, and we must therefore resort to various schemes in capturing and crating these nervous animals. In the past eight years we have offered for sale a considerable number of hoofed animals bred and born in the Park. This means the crating of a great number of shy and active animals, and our consultations have been many before we could decide upon the best methods of capturing them. Among several hundred deer shipped from the Park very few specimens have been sent away with as much as a bruise to illustrate our difficulties in crating them.

When we select deer to be crated, a consultation is held with the keepers in charge and a plan of campaign is mapped out. It is usually advisable to secure these animals in their shelter houses where they may be handled at close quarters; but this is not always possible, as some of our deer seldom go near their barns. In cases like this a room of the barn is selected as a trap, the animal's food is placed inside and a long rope is attached to the door. A scheme like this is not always successful. Some deer will immediately become suspicious of the unusual proceeding and prefer to fast, remaining out on the range where they are satisfied in picking up leaves or nibbling at the sparse grass. It was in this manner that we attempted to capture a herd of red deer. We were in despair of trapping them in the room until we decided to shut off their outside water supply and place a drinking trough in the room, together with their food. After five days' time, a man on guard with a rope controlling the door, noted an inclination of the animals to enter the house. They had several times approached the door, and would have entered during the night, but a sudden storm completely upset our operations. A heavy rain formed a generous pond in one corner of the range, and it was a full week's time before we finally captured these specimens.

It is considerably more difficult to pick out certain deer running with the herd. In work like this the plan is to run all the animals into a supplementary corral, and then release those not wanted. With all of the animals much excited and dashing about in every direction it is lively work to retain those specimens to be crated. So difficult is the handling of some of the hoofed animals that we often find it necessary to erect temporary spans of fence to separate them in the way described. When deer to be crated are enclosed in a room, we resort

SHIFTING A LARGE BEAR



CHUTE FOR SHIFTING BUFFALOES

to several methods in crating them. The larger deer are usually roped and pulled into a crate. With the smaller and more active specimens, several keepers rush them into corners, grasp them firmly and then force them into the boxes. While this work is not dangerous for the men, great care is necessary in handling the struggling animals to prevent breaking limbs and injuring antlers, and there is much padding of corners and of the crates themselves.

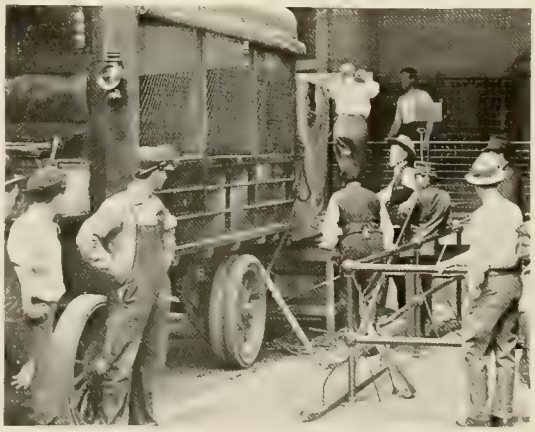
In moving reptiles, preliminary precautions are not so elaborate, although great care is necessary in handling the poisonous snakes. With very nervous examples, that will stop feeding if handled, we employ a box trap with a drop door. The snake enters the box to hide, the trap is removed to another cage, the door opened and the snake emerges at its leisure. With a big python the work is strenuous, but not particularly dangerous. The serpent is covered with a blanket, and through the folds a keeper seizes its neck. When the head is pinned down, eight or ten men quickly grasp the body; the writhing creature is straightened out, and then precipitated, tail first, into the new cage it is to occupy.

## ODD FRIENDSHIPS BETWEEN BIRDS

*By* Lee S. Crandall
*Assistant Curator of Birds*

WHILE there is undoubtedly an instinctive tendency among birds to seek mates of the same species, which accounts largely for the paucity of records of wild hybrids, there are numerous facts which tend to demonstrate that the barrier is, in many cases, a flimsy one at best and readily put aside under favorable conditions. One of the best-known cases is that of the Lawrence and Brewster warblers, hybrids between golden-wings and blue-wings. These cross-bred birds have been noted only where the ranges of the parent species overlap, and it would appear that proximity is the only requisite for mating. Numerous wild duck hybrids have been described, many of them doubtless resulting from unions between wing-tipped birds, unable to seek more natural mates.

In captivity, the objections of birds to alien species seem to be readily overcome, and many very interesting hybrids have been produced. The greater number have been obtained from water fowl, which are easily crossed. With many species, it is necessary to confine the birds in a compartment secluded from the sight of others. Very often, however, birds at large among a diverse assembly will select mates of totally unrelated species. One of the most striking instances was furnished by a large, unpinioned male Canada goose, which had winged his way from Lake Agassiz to Cope Lake, perhaps with the intention of selecting a mate from the geese gathered there. His fancy evidently was taken by the female Cereopsis goose. Her rightful mate, however, is a powerful bird and the Canada must needs go about his courting with discretion. He commenced his campaign by attaching himself to the pair and following their every movement most assiduously. The male Cereopsis appeared to resent this attendance and did not hesitate to show his dislike. Soon, however, he became more tolerant of the other's company and ceased his hostile demonstrations. After this point, matters went smoothly for the Canada. His attentions became more and more persistent, until finally he usurped the position of the Cereopsis. Once he had gained this coveted place, however, he



RECEIVING A LION BY EXPRESS

CANADA GANDER FOLLOWING A CEREOPSIS GOOSE

did not display the magnanimity of the deposed gander, but drove him to the far end of the enclosure. As we did not consider the disturbing our pair of Cereopsis desirable, the Canada was returned, with a clipped wing, to Lake Agassiz, when the Cereopsis soon reunited.

Male Egyptian geese are well known as tyrants, and will surely prove the rogues of any collection in which they are included. Their splenic tempers often turn them against their weaker companions, and catastrophes are of frequent occurrence. It caused us no regret, therefore, when our old Egyptian escaped from the pen in which he and his mate are always confined during the breeding season, and met with an accident which compelled his removal from the Wild Fowl Pond and allowed us to liberate his less quarrelsome mate. It had never occurred to us that the tyranny of the male Egyptian might be domestic as well as general, but the alacrity with which the female formed an alliance with a brant goose seemed to indicate no sorrow at the loss of her former spouse.

It is true, of course, that birds mated in this manner rarely lay eggs. We were greatly disappointed, therefore, when the Bewick and Trumpeter swans, which have been close companions for years, destroyed the nest of the bean and gray-lag goose, where the latter was closely incubating her five eggs. Some most interesting hybrids might have resulted from this cross.

It is well known that wild-fowl at liberty sometimes mate for life, and rarely separate until death claims one of the couple. That cross-mating and captivity do not affect the trait is well shown by an European brant and a lesser snow goose, which have been inseparable for about four years. There are several unattached birds of these species and of each sex in the same enclosure, but the stability of the union has never been threatened.

Many of these queer friendships are purely platonic and often are formed between birds of widely separated groups. When it was decided to attempt to acclimatize the rheas during the past winter, a male guinea-fowl which had shared their corral during the summer months, was allowed to remain with them. A perch was placed across one corner of the indoor shelter for his convenience, and on it he passed the nights of fall and early winter. As the temperature dropped lower, however, the bird was no longer to be seen in his accustomed place, and his absence caused an investigation to be made. A thorough search failed to reveal his presence, and it was not until a sleepy rhea was disturbed that the missing bird was found, warmly ensconced beneath her protecting wing! The guinea-fowl availed himself of the rhea's hospitality until the warm days of spring rendered this shelter unnecessary. He then turned upon his benefactor with a ferocity which she lacked the courage to oppose and pursued her relentlessly about the enclosure. It was a truly ludicrous sight to see the diminutive bird driving his lumbering victim about the paddock, but the matter became so serious as to cause the tyrant's removal.

One of the most remarkable of these associations is that of the Ceram cassowary and the great marabou stork. Each spring, with the return of warm weather, the cassowary is given his liberty in the Crane Paddock. This is also the summer home of the Javan and Indian adjutants and the marabou. The latter tolerates the company of his allies during the few weeks that elapse between the date at which they are placed

TAHR ON THE TREE GUARD

in the paddock and the coming of good weather of sufficient constancy to insure the safety of the Cassowary. When the great bird finally is added to the group, the pleasure of his grotesque companion is unmistakable. Each is allowed the most unexpected freedom with the other's person, and frequently the cassowary may be seen lying upon the ground, the marabou perched solemnly upon his back, often with his long wings widespread. Until fall, the two birds are constantly in each other's company, and are separated only when it becomes necessary to remove them to warmer winter quarters.

## ZOOLOGICAL PARK NOTES.

*The Agile Goat.*—It would be exceedingly difficult and very likely a useless task to attempt to prove with words alone the extraordinary mountaineering feats of the wild sheep and goats. In the language of a hunter, inelegant but expressive, "they can perch where a telescope can't look." Visitors to the Park frequently see the Rocky Mountain goats airily standing on the ridge of their shelter, or running lightly along the roofs. No matter what the condition of the roof may be, it is negotiated with perfect ease.

This feat, however, becomes rather commonplace in comparison to one performed by the Himalayan tahr on Mountain Sheep Hill. In their corral, directly on the ridge, stands a cedar tree ten inches in diameter. To protect it from the horns of the tahr family, a tree-guard of small slats was placed around it and securely fastened with wires. These sticks are five feet long, two inches wide, an inch thick and stand close to the tree, offering the most precarious foothold. Passing Mountain Sheep Hill recently, I was astonished to observe one of the goats lightly perched on the top of the guard, nimbly shifting her feet from stick to stick. There is but one way for the goat to get to the top of the guard, a straight leap from the ground, and absolute precision in alighting on the ends of the sticks. Mr. Merkel assures me that he has seen the goat with *all four feet on the end of one stick.* The accompanying picture does not show the goat's method of getting on the guard, but it undeniably proves that it can be done. My personal knowledge of the temper of this particular animal may fairly be regarded as proof that it would be a physical impossibility for any one to have posed her in the airy position that the photograph records.

*A Reliable Engineer.*—Take a small stream, a generous supply of trees (poplars and birches are best), plenty of peace and quiet, put a fence around it and add a good sized healthy American beaver. After you have done all this, come back to your peace at dusk, being perfectly certain that you furnish the quiet, and prepare to see a wonderful display of animal ingenuity.

Such an opportunity was afforded me once at our Beaver Pond and after several trips—during which time I failed to bring along enough quiet—the beaver furnished me an exclusive entertainment. The Beaver Pond is a stationary body of water and to maintain it in clean condition, a hydraulic ram keeps the water at a suitable height. In order that the water does not overflow the banks, a twelve-inch pipe has been placed under the dam in the bed of the stream. At the end of the pipe, under the dam, an elbow and a thirty-inch perpendicular joint have been attached to serve as an overflow for the pond after the water has attained a certain level.

But the beaver, not agreeing with these utilities, waged a continuous warfare with the men as to the ultimate maintenance of the water supply; and upon my successful visit I learned just

how he did it. It was nearly dusk when his nose popped out of the water near the dam. Drawing himself clumsily upon the bank, he carefully inspected the matted sticks and mud that filled the outlet of the stream from bank to bank. Apparently satisfied that there was no leakage there, he turned to the overflow pipe and peered down into the black hole.

The sound of falling water was proof that this spot needed work. Scarcely hesitating, he dived from the bank and presently reappeared with the butt of a small tree about three inches in diameter and four feet long. Dragging it to the hole he lowered it until it stood upright. With unflagging energy he made trip after trip to the bottom of the pool, each time carrying limbs of various sizes to the pipe and jamming them into it. When the stick seemed too long, he withdrew it and made a notch near the center, and, upon returning to the hole, the stick would then bend to follow the curve of the pipe. Finally he commenced to fill the interstices with mud.

In carrying the mud he was quite as ingenious as he had been in rafting his timber. Sinking to the bottom of the pool, he pushed himself along the bottom with his hind feet, plowing the mud ahead with his breast until the bank was reached. Here he seized the pile with his fore feet and, clasping it against his breast, waddled slowly to the hole and dropped it in. The number of steps back and forth to the water were innumerable, but they did not falter until the sound of the falling water was lessened and finally ceased altogether. Knowing then that his work was at end, he sat on the edge of the pool to rest and comb the mud out of his plentifully bedaubed fur.

*New Zebra House.*—This installation for the wild equines, with its outlying yards, will be completed and opened early this fall. The various species of wild horses, asses and zebras, of which the Society has an extensive collection, may then be exhibited to a good advantage. The collection and new installation will be thoroughly described in the next number of the BULLETIN.

*Friendly Red Squirrels.*—There is not one wild creature in the woods that is as shy as the red squirrel; particularly when he dwells within striking distance of boys with guns. After many of these experiences he may be heard scolding and chattering deep in the woods, but affords only fleeting glimpses of his lithe red body as he skips about through the trees. As soon as he learns of a section of the woods where he is not molested his timidity disappears and he becomes the boldest of beggars.

At Rock City, in the Bradford oil regions, there are a few acres in which the red squirrel finds a safe refuge. Despite the fact that the grounds are swarming with people, little redskin is quite at home, and boldly runs around among the luncheon parties, begging for bits of bread or any delicacy they may offer.

*Woolly Monkeys.*—One of the two little woolly monkeys from the upper Amazon has now lived in the Park for nearly three years. This is a record for keeping this delicate little animal in the Park, at least, if not in any other zoological garden. The two live out of doors during all the days when the weather is agreeable; evidently a good policy for their health has remained uninterruptedly excellent.

*Guinea-Fowl.*—The guinea-fowl run about the Park with a very business-like air, and always impress one, as they scurry across the paths and through the bushes, as having an important mission which they are hurrying to fulfil. They invariably steal a nesting site which they conceal with great care. Whenever the hens lay they announce it by bursting out of the bushes with a tremendous noise, which is immediately echoed by the whole flock. Even though this important event is so loudly advertised, the nests are difficult to find and the appearance of a flock of young guinea-fowl is always in the nature of a surprise. When the young are hatched they have a devoted following of old birds that vie with each other in searching out delicate insect morsels for the hungry flock. Guinea-fowl are desirable birds around plant and vegetable gardens, as they wage a persistent warfare on all insect pests and seldom scratch up the ground. To some nervous persons the voice of the guinea-fowl is distracting; but to those of us who have grown accustomed to the cry of the pea fowl, the song of a guinea-hen is not without its charms.

*How the Gnu Drinks.*—The old adage, "there is nothing new under the sun," has been disproved by the gnu. It is quite well known that all ruminants plunge there noses into water when drinking, and draw the water into their stomachs by a muscular contraction of the throat aided by the slight vacuum created. But

the gnu does not do it that way. They lap the water like a dog or a cat. This may be accounted for by the fact that the nostrils, which are thin, flat and wide, are placed near the end of the muzzle. Should the gnu thrust his nose into the water the very narrow air space would be completely covered and afford no means of breathing while drinking.

*Ivy from Fontainebleau.*—Mrs. Eli Harvey has presented to the Park a root of ivy from the famous forest of Fontainebleau. This noted forest has been the Mecca of all the artists of France from time immemorial. Rousseau has glorified the old oaks, and could the silent aisles of the forest speak what a wondrous story they might tell of the generations of painters that have transferred its marvelous beauty to their canvas. Mrs. Harvey has planted the tiny sprig against the sheltered side of an ancient oak near the Bear Dens.

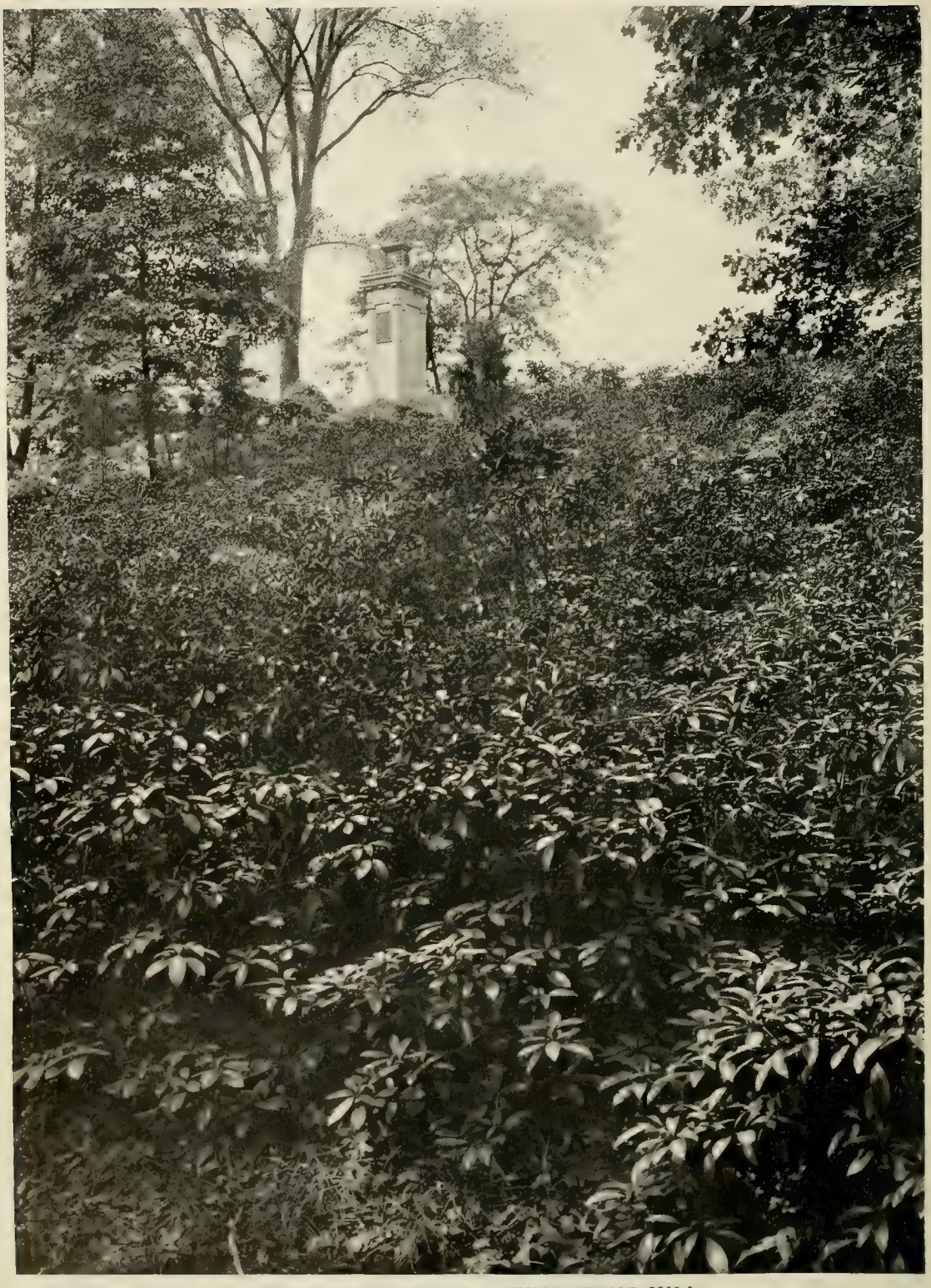
*Collecting Reptiles.*—Curator Ditmars has just returned from a successful collecting trip in Sullivan County. He secured 11 species and 115 specimens of our native reptiles. In addition to these, he also captured 129 specimens of insects, including a splendid lot of katydids. Enumerating the species, there were represented in the collection 6 rattlesnakes, 14 milk snakes, 75 striped snakes, 3 red-bellied snakes, 5 ring-necked snakes, 13 water snakes, one black snake, one hog-nosed snake, 2 ribbon snakes, 17 katydids, 14 broad-winged meadow locusts, 50 walking sticks representing 2 species, eighteen narrow-winged meadow locusts, 12 lesser katydids, 8 ground katydids, and 10 cone-headed locusts.

*New Shops.*—Destruction of the old worn out workshops and sheds in the Service Yard is progressing steadily, and the buildings that for so long have answered a useful purpose will soon be a matter of ancient history. The Pelican House for birds is rapidly nearing completion, and work upon other structures will soon be in progress.

*An Agressive Giraffe.*—The giraffe is one of the mildest, most inoffensive animals, and the large placid eyes, so like the "gazelle-like eye" of which the Arabian poets write, are almost conclusive proof of its excessive timidity. But the giraffe does not lack courage nor aggressiveness in defending himself. Not having horns of a dangerous character, he makes use of the best weapons available—the two fore feet. Backed by considerable weight, he is able to strike out forward with terrific force and great precision. The movements of the giraffe are awkward, but carry him over the ground so rapidly that he is close enough to strike before one is aware of it. A blow from either foot would be a very serious matter, and the keepers have had several narrow escapes from our large male specimen.

*The Chipmunk.*—One of the most cheerful and active dwellers in the woods of the Park is the common chipmunk. Like the red squirrel he selects a suitable place for a home and apparently after he has determined upon the location resides there indefinitely. For many years one of these hard-working little rodents has dwelt under a boulder near the Beaver Pond. Almost any bright summer morning he may be seen perched on the top of his home-site basking in the warm sun. His labor in securing food for the long winter is limitless, and in pursuit of his task he radiates in all directions from the home base. When the wild cherry is fruitful, he scurries about under the trees stuffing his cheek pouches almost to the bursting point; making countless trips from the harvest to the storehouse. How much food is required to carry him through the season when supplies cannot be obtained, is beyond comprehension, but the energy with which he pursues his task would indicate that the amount stored must be enormous. Considering the chipmunk's energy and the fact that he is only a trifle smaller than the red squirrel, some idea of the storing capacity of the chipmunk may be gained by the fact that in a tree which was cut down in the Park was found a squirrel's nest that contained at least two pecks of hickory nuts. This comparison is based upon the respective working ability of the two rodents.

*Friendly Tortoises.*—It is a matter of wonder to observe the attitude of the giant tortoises toward visitors. Like many of the other animals they have learned to beg for food, and the most astonishing part is the kinds of food they will take. It is not strange that the monkeys, deer, elephants, and even ducks, geese and peacocks accept peanuts or candy, but it is decidedly humorous when a great lumbering tortoise painfully struggles to the top of the wire fence with his fore flippers and willingly eats ham sandwiches or pie, and moreover devours the food with decided relish. E. R. S.



MOUNTAIN LAUREL, ROCKING STONE HILL

# GENERAL INFORMATION

## MEMBERSHIP IN THE ZOOLOGICAL SOCIETY

Membership in the Zoological Society is open to all interested in the objects of the organization, who desire to contribute toward its support.

The cost of Annual Membership is $10 per year, which entitles the holder to admission to the Zoological Park on all pay days, when he may see the collections to the best advantage. Members are entitled to the Annual Reports, bi-monthly Bulletins, Zoologica, privileges of the Administration Building, all lectures and special exhibitions, and ten complimentary tickets to the Zoological Park for distribution.

Any Annual Member may become a Life Member by the payment of $200. A subscriber of $1,000 becomes a Patron; $2,500, an Associate Founder; $5,000, a Founder; $10,000, a Founder in Perpetuity, and $25,000, a Benefactor.

Applications for membership may be handed to the Chief Clerk, in the Zoological Park, Dr. C. H. Townsend, N. Y. Aquarium, Battery Park, New York City, or forwarded to the General Secretary, No. 11 Wall Street, New York City.

## ZOOLOGICAL PARK

The Zoological Park is open every day in the year, free, except Monday and Thursday of each week, when admission is charged. Should either of these days fall on a holiday no admission fee is charged. From May 1 to November 1, the opening and closing hours are from 9 o'clock A. M. until one-half hour before sunset. From November 1 to May 1, the opening and closing hours are from 10 o'clock A. M. until one-half hour before sunset.

## NEW YORK AQUARIUM

The Aquarium is open every day in the year: April 15 to October 15, from 9 o'clock A. M. to 5 o'clock P. M.; October 16 to April 14, from 10 o'clock A. M. to 4 o'clock P. M. No admission is charged.

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Souvenir Books and Post Cards of the Zoological Park may be obtained by writing the Chief Clerk, New York Zoological Park, New York City.

Publications and Post Cards of the Aquarium may be obtained by writing Dr. C. H. Townsend, Director, Battery Park, New York City.


NEW YORK ZOOLOGICAL SOCIETY

Vol. XVI. No. 54 NOVEMBER, 1912

# ZOOLOGICAL SOCIETY BULLETIN





Published by
THE NEW YORK ZOOLOGICAL SOCIETY

ARTHUR FREUND 1912

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# ZOOLOGICAL SOCIETY BULLETIN

## AQUARIUM NUMBER

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Prepared and Edited by Dr. Raymond C. Osburn

ORANGE FILEFISHES IN THE NEW YORK AQUARIUM

# ZOOLOGICAL SOCIETY BULLETIN

*Published by the New York Zoological Society*

VOL. XVI NOVEMBER 1912 NUMBER 54

## THE CRAYFISH

NONE of the inhabitants of fresh water are better known to the casual observer and few have been the subject of more study by naturalists and scientists than the crayfishes. These are popularly known by a variety of names such as crawfish, crawdad, cray, lobster, crab, etc. The origin of the word "crayfish" is interesting as an illustration of the changes which words sometimes undergo during the evolution of languages. Apparently from the Old High German word "Krebis" there have been derived the modern German word "Krebs," the Old French "crevice" from which has come the modern French "ecrevisse," and the Old English "crevis" or "creves," which has been corrupted into "crayfish" and still further into "crawfish."

Every country lad knows where and how crayfishes may be found, and is quite familiar with their propensity for stealing bait when he is fishing for the far more desirable suckers, catfish and shiners; and what barefooted urchin in the country does not possess among his treasures at least a few crab's-eyes or lucky-stones, as the calcareous concretions formed within the thorax are called? Though harmless enough, they are usually greatly feared by the small boys and girls who love to wade barefooted in the shallow streams and ponds. The bass fisherman fully appreciates the value of the soft-shelled stage as a tempting lure for the wily game.

Popular writers have, for the most part, overlooked the possibilities of the crayfish and references to this interesting animal outside of scientific literature are rare indeed. James Whitcomb Riley, who has been able to see something of poetic charm in many of the humble creatures of the woods and streams, evidently considers the crayfish as occupying the lowest limit of existence, for he pictures a treetoad utterly disgusted with the long and continued drought, which

> "Jest backed down in a crawfish hole
> Weary at hart and sick at sole."

Alfred Henry Lewis's "Crawfish Jim," though harmless, is not a particularly attractive character. Even the English language takes a fling at the little crustacean on account of his mode of backing out of difficulties, and "crawfishing" is widely and slightingly applied to this method of the human species in escaping from an unpleasant situation.

Various scientific monographs have been written on the structure, habits, distribution and relationship of the crayfishes, while their use as a laboratory type for the purpose of illustrating the crustacea has become a matter of course in the colleges and secondary schools of Europe and America. Yet in spite of all that has been written by the scientists, the natural history of the crayfish is but little known to the general reader, and it is commonly regarded as a useless and uninteresting animal, which may occa-

CRAYFISH, DORSAL SIDE
The abdomen is turned under as at the end of a swimming stroke.

sionally serve for bait or to furnish amusement for the youngsters, and which sometimes makes a nuisance of itself by burrowing into dams and levees, allowing the water to seep out.

Even the fact that the crayfish has a very considerable food value is known to but a small percentage of Americans. The crayfishes are all edible and are eaten in many parts of the world, and only the small size of most of the species has prevented them from being any less popular than the lobster as an article of diet. The large muscles of the abdomen, similar to those of the lobster, are the most valuable parts. Many a country boy has discovered that a luscious tidbit may be obtained by removing the big muscle and toasting it on a stick before his campfire. In Europe they are commonly used, and in some places are cultivated for market.

The special report on the fisheries of the United States contained in the last report of the Bureau of the Census, states that in the year 1908 the total catch of crayfish in this country was 666,000 pounds, netting the fisherman $34,000—a little over five cents a pound. The states chiefly interested in this industry at that time were Louisiana, 88,000 lbs.; Oregon, 178,000 lbs., and Wisconsin, 348,000 lbs. But the Oregon crayfish (of the genus *Astacus*) are larger than the eastern species (of the genus *Cambarus*) and so command a higher price. Perhaps the absence of lobsters from the Pacific coast may have been a contributing factor, but at any rate the Oregon catch was valued at $14,000, while the Wisconsin catch, though nearly twice as large, was valued at the same figure. While crayfishes may be taken by lines, nets and seines, the chief method of capture is the trap or pot, and, according to the census estimate, 606,000 pounds of the total were taken in this manner. In New York City the demand for crayfishes is confined almost entirely to the foreign population, who have learned abroad to appreciate the delicacy of this aquatic food. Yet a very considerable quantity is consumed here, and shipments are received from numerous sources. Dr. E. A. Andrews* is responsible for the statement that one-half million crayfishes are shipped to New York annually from a very limited region on the Potomac River.

The crayfishes belong to the decapod, or ten-footed crustacea, and are thus closely related to the marine lobster and prawn. They constitute a separate family, the *Astacidae,* which is represented in every continent (Africa excepted) and in many of the larger islands of the world. This family is divided into two sub-families: the *Astacinae* and the *Parastacinae,* limited respectively to the northern and southern hemispheres, with the exception that the genus *Parastacus* of South America ranges northward into Mexico. For some unknown reason, the crayfishes have been unable to adapt themselves well to the conditions of life in the tropics, and but few species are found outside of the temperate zones. Quite a number occur in Mexico, especially in the highlands where temperate conditions obtain.

The *Astacinae* contain three genera whose distribution is very interesting and the reasons for which are not fully understood. The species of *Astacus* occupy Europe and western Asia and the Pacific slope of North America, while the genus *Cambarus* is limited to North America east of the Rocky Mountains, and the closely related *Cambaroides* to eastern Asia. Thus each group, *Astacus,* and *Cambarus* plus *Cambaroides,* is divided into two widely separated fields, between which occurs a division of the other group. There is no overlapping of the groups to indicate that they have occupied the same region at the same time. The absence of crayfish from Africa is especially interesting in view of the fact that they occur in Madagascar. This, however, is in accord with the distribu-

*The Future of the Crayfish Industry. Science, new series, vol. XXIII, pp. 983-6.

tion of certain other Madagascar animals, for example, the true lemurs, which flourish on this and other islands of the Indian Ocean, but not on the mainland.

The first important work on the North American crayfishes was that of Hagen* in 1871. Since that time Faxon and Ortmann have added greatly to our knowledge of the group. Hay† lists eighty-four species, only five of which belong to the genus *Astacus,* found west of the Rocky Mountains. The remaining seventy-nine belong to *Cambarus,* found east of the Rockies. Nine species, plus three varieties, were listed for Mexico, Central America and the West Indies. More recently several additional species have been described.

Ortmann‡ has divided the crayfishes of North America according to their habits into three groups: I, river species; II, mountain stream species, and III, burrowing species. While no sharp distinction can be made between these groups, it is true that many species are confined entirely to larger streams and lakes, others are never found except in small cold streams and springs, while others are entirely burrowing in habit. The burrowing species are often found at considerable distance from any open water, in lowlands where they can have water the year round by digging holes, which, in extreme cases, extend to a depth of three or four feet. Some species, known as chimney builders, deposit the earth brought up in constructing the burrow in a ring of pellets around the opening, sometimes extending to a height of ten to twelve inches and a diameter of twelve to eighteen inches, though usually the piles are much smaller. According to Ortmann (l. c., p. 42) there is no evident purpose in constructing circular mounds. The crayfish simply adopts the easiest way of getting rid of the dirt removed from the burrow. Each hole contains only one individual, except during the time the young remain with the mother and also at the mating season, when a pair may occupy the same burrow. The holes are often found sealed up by pellets of earth placed at or near the mouth, and this is especially true in winter when they may remain sealed for three or four months.

Crayfishes are all more or less nocturnal in habit, though some of the species of the larger streams and ponds wander about a good deal during the day and are not at all averse to taking food in the daytime. Other species confine their activities to the night and lie hidden away under stones or in burrows the rest of the time. Four species found in the United States are blind and inhabit caves. The best known of these is *Cambarus pellucidus* (Tellkampf) of Mammoth Cave, Wyandotte Cave and other caverns of Kentucky and Indiana. The eyes of crayfishes are compound (*i. e.,* composed of numerous facets) like those of insects and other crustaceans. The facets are arranged in a hemispherical form on the end of the movable eye-stalk, but in blind species the facets are wanting.

FEMALE CRAYFISH

Under side showing abdominal legs or swimmerets. The last two pairs of walking legs end in spikes, the others have pincers for holding the food.

The crayfish can walk in any direction, backward, forward or sideways, by means of the thoracic legs, though progress by this means is slow. Especially is this true on land, where, not having the buoyancy they possess in the water, they drag themselves along in a laborious fashion. In swimming the crayfish uses his abdoment after the same manner as the lobster, and a quick movement of the tail will send him darting backward through the water for some distance. When cornered he will defend himself vigorously with the large pincers, but he usually

*Memoirs of the Museum of Comparative Zoology of Harvard College, II, No. 1.

†Synopsis of the *Astacidae* of North America. American Naturalist, December, 1899.

‡Crayfishes of Pennsylvania. Memoirs of the Carnegie Museum of Pittsburgh, vol. II, No. X, 1906.

considers discretion the better part of valor, and escapes if opportunity offers. The method of swimming has two advantages: he presents his large fighting claws to his enemy while fleeing, and when cover is reached he can enter it backward without stopping to turn around and blocks pursuit with his claws. In fighting he possesses some of the qualities of the bulldog, and doesn't always know when to let go. If a stick is poked at him, he may attack it with such vigor that he can be drawn from his retreat, or even out of the water before it occurs to him that he can release his hold. The species which live on a muddy bottom would seem to have taken a lesson from the Hebrew exodus, and learned to cover their retreat by a pillar of cloud. In this case, however, the cloud consists of mud which is stirred up to such an extent by striking the tail on the bottom that their whereabouts is effectively obscured. When, after a few minutes the mud is settled, the crayfish may be seen half buried under it, his colors completely obscured by it, and his slowly moving antennæ and watchful eyes the most conspicuous parts observed.

In New England crayfishes are not common, and only one species (*C. bartonii*) has been reported. West of the Adirondacks and Catskills they become very abundant, and this is especially true of streams having their source in the Alleghenies and in the great central basin of the United States. No less than twenty-five species and varieties inhabit the Ohio River basin, which is perhaps the richest area in the world in species of crayfishes. Species are numerous in the South Atlantic and Gulf States, and also in the region of the Ozark Mountains west of the Mississippi.

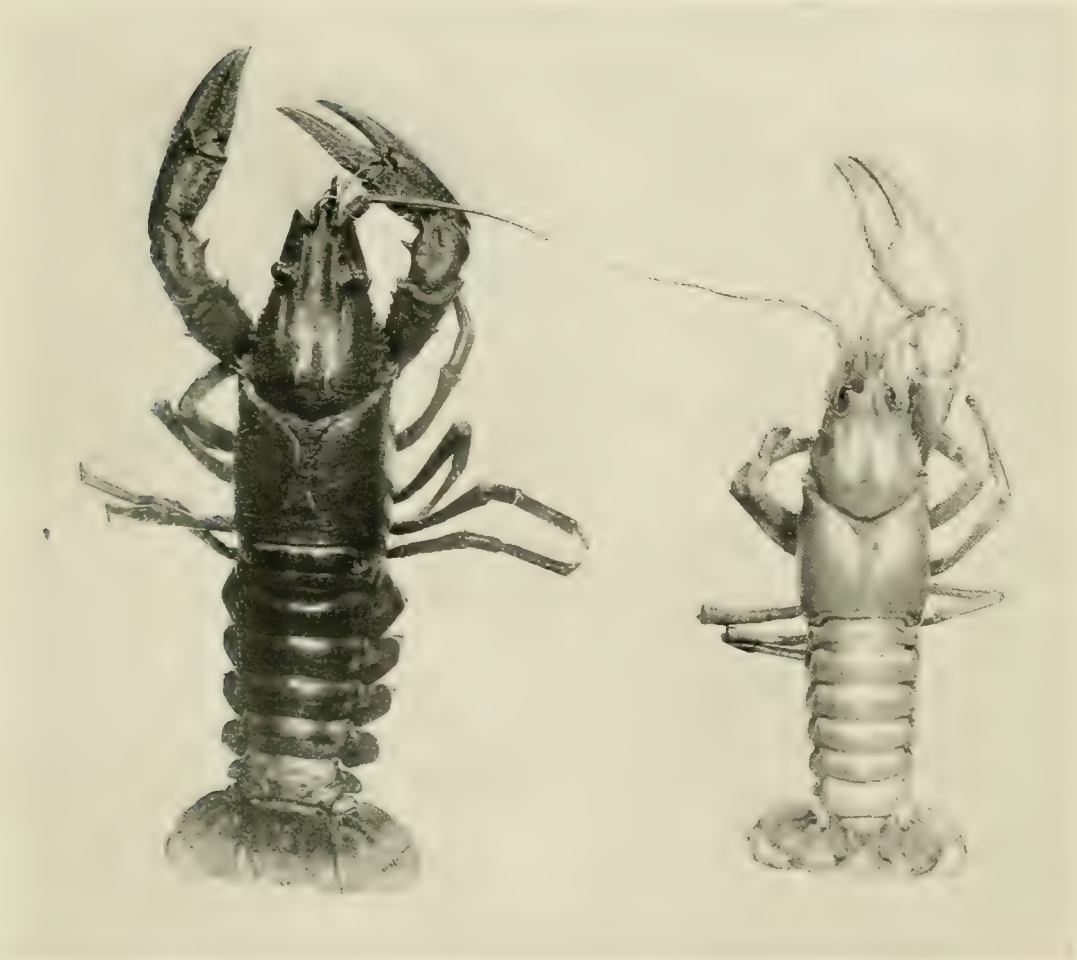
In the number of individuals these regions are no less rich than in number of species. A single haul of a fine-meshed seine will often yield hundreds of them. In the writer's experience in collecting fishes in Ohio, the crayfishes were frequently so abundant as to materially impede the progress of the work. A half-bushel of crayfish would often have to be looked over and the smaller fishes separated from the clawing and snapping mass, and when recovered, were often found injured by the large pincers of their armored fellow captives.

Thus far only a single species has been reported in the region about New York City*. This is the widely distributed *Cambarus bartoni* (Fabricius), which occurs in eastern Canada and eastern United States south to North Carolina and west to Indiana, and which is the only species reported from New England. Recently the New York Aquarium has obtained an abundance of specimens of another species, *C. limosus* (Rafinesque), from Central Park Lake, New York City, and Prospect Park Lake, Brooklyn. This species has not hitherto been known outside of the Delaware, Potomac and Susquehannah river drainages, except for one locality, Redbank, New Jersey, in the New York Bay drainage (see Ortmann's "Crayfishes of Pennsylvania"). Its appearance in the park lakes of New York City thus extends its range considerably. Dr. Ortmann has called my attention in a recent letter to the fact that this species has been introduced into a lake at East Hampton, Connecticut, and also that it has been naturalized, locally, in Germany. *Cambarus limosus* is essentially a lowland species of the rivers and ponds, while of *C. bartoni*, Ortmann (l. c., p. 447) says "Ecologically this species is a form of the rapid and cool waters of the uplands and mountains, living preferably in small streams and even in springs,"

*Cambarus limosus* is now abundant in the artificial lakes of New York City. On seining trips to these lakes, made by employees of the Aquarium for the purpose of obtaining fishes, they have been taken readily, sometimes a couple of dozen or more at a haul. Whether they occur in the lowland streams of the vicinity has not been determined. Neither is it known whether their appearance here is of recent date, or whether they have merely been overlooked. At any rate, there are no records of occurrence in this vicinity, and the study of the specimens in the local museums reveals only very recent captures from these same lakes.

As to the possibility of recent distribution to the eastward from the Delaware River system, it would seem that this may have been facilitated by means of the Raritan Canal. In this case their appearnace in Central Park Lake would have necessitated the species distributing itself across the brackish waters of New York Bay or the lower Hudson River, and to get to Prospect Park Lake the East River would also have to be crossed. No crayfishes are found in salt water, however, and this fact would seem to be opposed to such a distribution. Experiments have been made at the New York Aquarium to test the resistance of this species to the harbor water, and it has been found that in brackish water having a specific gravity of 1.14 degrees they will live for many days. If investigation should prove that the species has distributed itself commonly in eastern New Jersey, the hypothesis that they have gained access to the park lakes through the brackish water of the

*Paulmier. Higher Crustacea of New York State, Bull. 91, New York State Museum, 1905.



NORMAL AND PALE PHASES OF *Cambarus limosus*

The pale form is really much lighter than it appears in the cut, being nearly white. Photograph by R. C. Osburn.

lower Hudson would gain considerable support. There is a possibility that they may have been distributed accidentally among water plants, or that they have been purposely carried by some one. At any rate there is no question but that they have permanently adapted themselves to the local waters.

Our two local species of crayfishes may be readily distinguished as follows: *Cambarus limosus* has a strong spine on either side of the rostrum, or pointed projection between the eyes, while *C. bartoni* has no marginal spine on the rostrum. In *C. limosus* there is a patch of spines on either side of the carapace in the region of the cervical, or neck, groove, while in *C. bartoni* this region is only slightly granulated. There are various other well-marked differences in structure, form and color of the body, and especially in the appendages.

A distinct color variation not hitherto noticed in the species has appeared in *C. limosus* from this vicinity. Faxon* and Ortmann (l. c., pp. 355-6) have carefully described the colors as usually found, which briefly stated are: Chief color olivaceous with large blotches of dark green; under parts pale. Each segment of the abdomen is marked above by paired brown (burnt sienna) spots and there is a brown spot on each side below the eye. The tips of the big pincers are ferruginous and behind this is a ring of dark green or nearly black.

The color variety is not a case of albinism, for the eyes appear to be as fully pigmented as in the typical form, but there is an almost total suppression of the normal body coloration. The ground color is almost white, but it is tinged

*Revision of the *Astacidae*, Memoirs of the Museum of Harvard College, vol. X, p. 88.

CRAYFISH
In the water the crayfish balances himself easily on the walking legs Photograph by R. C. Osburn

with pale bluish on the upper part of the thorax and abdomen and on the legs. There is no indication anywhere of the dark green or blackish pigment, and the only red to be observed is a faint tinge of this color in the region where the abdominal spots occur in the normal form. No structural differences have been observed.

Cases of partial albinism or suppressed development of color have been noted occasionally in various species of animals. Of the crayfish Dr. Ortmann writes thus in reply to a recent letter: "The pale blue color-variety is very remarkable indeed. Bluish specimens, as a color-variety, have been described in European species of *Potamobius* (*Astacus*), but have always been regarded as extraordinary cases. I have occasionally observed slate-blue specimens in *Cambarus bartoni*, but always single individuals only. I have received specimens of a whitish variety of *C. virilis* from Sandy Lake, Peterboro County, Ontario, Canada, a lake remarkable for its limestone deposits, but here they are all said to be of this color."

More than two dozen specimens of this pale phase of *C. limosus*, of both sexes, have been taken at different times in Prospect Park Lake, Brooklyn, during the past two summers, among about two hundred of the ordinary color phase—no exact counts were made.

What may be the cause of the suppression of the ordinary colors in this and similar cases of partial albinism is not known. Whether it is due to some congenital variation (mutation or saltation), which would then be hereditary, or whether it is due to some physiological condition developed during the life of the individual is unknown, and could only be determined by breeding experiments. From the number of specimens and from the fact that they were taken living with the ordinary variety, it seems probable that the difference is congenital and due to the suppression of a color-developing factor. This assumption is further borne out by the fact that color is not entirely absent, but merely suppressed in large part.

The reproduction of the crayfish is very interesting and has been the subject of much study in this country, especially by Professor E. A. Andrews,* of Johns Hopkins University.

It has long been known that the crayfishes have no larval surface-swimming stages as do their marine relatives, the lobsters and prawns. As early as 1755 von Rosenhof noticed that the young of the European crayfish are similar to the mother and that they remain with her for a time after hatching. Rathke in 1829 showed that the young emerges from the egg in essentially the adult form and so has no metamorphosis. Later, however, Huxley (1879) proved that the young before the first moult are not exactly similar to the adult, but differ in the lack of setae, or bristles, and in the form of the first and sixth abdominal appendages. Thus it will be seen that there is only a slight degree of metamorphosis and of a different sort from that seen in the marine crustacea.

The reason for the elimination of the free-swimming stages is probably to be found in their adaptation to a special habitat. If a surface-swimming stage were present, as in the lobster,

A FEMALE CRAYFISH
Showing method of carrying the eggs.
Photograph by R. C. Osburn.

the young of the mountain stream species might be carried into the larger streams, while those of the inhabitants of the lowland streams might even be carried out to sea at this period.

The eggs of the crayfishes are regularly laid in the early spring and the time of laying for

*The Young of the Crayfish, *Astacus* and *Cambarus*. Smithsonian Contributions to Knowledge, vol. XXX, pp. 1-79, plates I-X.

any species may extend over a considerable period—in *Cambarus bartoni,* for example, from March 15th to May 15th. Chidester* has observed that in *C. bartoni* var. *bartoni* there is also an autumnal spawning season beginning with the latter part of September and extending through October and November. Although Chidester does not discuss the matter, this probably does not mean that two broods are produced in a season, but that some of the females mature their eggs in the spring and others in the fall.

Andrews† has carefully studied the reproduction of *Cambarus affinis.* Three hundred to six hundred eggs, of a diameter of about one and one-half millimeters, are produced. These, as in the lobster, become attached to the under side of the abdomen, especially on the swimmerets, by adhesive portions of the egg envelopes. The eggs are laid in April and May and hatch in a few weeks, the time apparently depending on the temperature of the water.

When first hatched each young crayfish is attached by the telson thread, a string of cuticle fastened at one end to the telson or last abdominal segment and at the other to the now empty egg membrane. In this condition they remain for two days, when they moult and pass from the first stage to the second. In the second stage also the young are inactive and remain with the mother, but the telson thread is lost and they remain attached by grasping the old egg cases and the abdominal setae with their pincers. During this time they eat nothing and the yolk sac is gradually absorbed. After six days in this condition the skin is again moulted and the young emerge in the third stage. By this time they have taken on the form of the adult, except that the proportions are somewhat different.

The third stage marks the beginning of active life, and, while the young remain with the parent more or less closely for a week or so, they gradually wander away and begin an independent existence. By fall the young ordinarily reach a length of about two inches and are sexually mature, and the first pairing takes place in October or November of the first year.

After this there are no more moults and consequently no growth until the young have been produced in the following spring.

How long crayfishes live has been ascertained for only a few species. Andrews found no specimens of *Cambarus limosus* living after the third summer, and Ortmann states that, except in occasional individuals, three years constitutes the life period of *C. obscurus.* The European crayfish *Astacus fluviatilis,* has been known to live six years.

Size is dependent largely upon the species. Some of our smaller species do not attain a greater length than a couple of inches. *C. limosus* reaches a maximum of about four inches, while the European *Astacus fluviatilis* grows to nearly eight inches. The largest species known is *Astacopsis franklinii,* found in small streams of Tasmania, which reaches a weight of eight or nine pounds and is thus about equal in size to the European lobster.

The crayfish has many natural enemies. Perhaps the most destructive are various species of fishes, the larger salamanders, such as the mudpuppy (*Necturus*) and hellbender (*Cryptobranchus*) and water-snakes. No doubt the semi-aquatic mammals take their toll and the raccoon is said to be particularly fond of them. Many aquatic birds feed upon them. They are parasitized by leeches, copepod crustaceans and worms. The shells are often overgrown with diatoms and algae, and those from our park lakes are often covered with a profuse growth of a large colonial protozoan (*Epistylus*). It is doubtful if these do any particular harm, except, perhaps, to impede the progress of the crayfish when the growth is abundant. Furthermore, all crayfishes are given to cannibalism to some extent, and not only are young devoured by the adults, but full-grown specimens, when shedding, may be attacked and devoured before the new shell has had time to harden enough to serve for a protection.

CRAYFISH COVERED WITH PROTOZOANS
One-half natural size. Photograph by R. C. Osburn.

*American Naturalist, May, 1912.

†Smithsonian Contributions to Knowledge, vol. XXXV, 1907.

ZOOLOGICAL SOCIETY BULLETIN.

Departments:

*Mammal*
W. T. Hornaday.

*Reptile*
Raymond L. Ditmars.

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

*Bird*
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Elwin R. Sanborn, Editor.

Vol. XVI. No. 54 NOVEMBER, 1912

Minute adopted by the Executive Committee of the New York Zoological Society, held on Tuesday, the eighth of October, One thousand nine hundred and twelve.

*Resolved,* That the Executive Committee learn with deep regret of the death of Mr. Hugh J. Chisholm, a member of the Board of Managers since 1900.

From the time of the early development of the New York Zoological Park, when interest and support were most needed, Mr. Chisholm always displayed the keenest interest in the great undertaking and readiness to assist in its development in every way. He attended all the meetings of the Board, and always expressed great pleasure in the progress of the work. His generosity and good-will were a source of strength to the Executive Committee, and it is with a sincere sense of loss that this entry is made upon the minutes.

## AMERICAN FISHERIES SOCIETY

The annual meeting of this society was held in Denver, occupying three days, from September 3d to 5th, inclusive, Mr. S. F. Fullerton, of St. Paul, Minn., presiding. Fifty-three members were present, a good attendance considering that a majority of the membership reside in the eastern states.

The following papers, embracing many fields of fisheries work, were read and discussed at the meeting:

A Defense of the Humble Dogfish. By George Wm. Miles.
Protection of the Undersized Fish. By G. H. Thomson.
The Black-Spotted Mountain Trout. By S. E. Land.
The Whitefish. By C. H. Wilson.
The Whitefish. By T. S. Palmer.
Report on Progress of the Building of New Pond-fish Hatchery in Kansas. By L. L. Dyche.
The Kansas Fish Law. By L. L. Dyche.
Report on Oregon Fish and Game Laws. By C. K. Cranston.
The Catfish as a Host for Fresh-water Mussels. By A. D. Howard.
The Oyster and Fish Industry of Louisiana. By W. O. Hart.
Some Suggestions Looking Toward the Enlargement in Scope and Membership of the American Fisheries Society. By H. Wheeler Perce.
Pollution of Public Waters in Massachusetts. By G. W. Field.
Demonstration of Free Pearls of Forced Production. By R. E. Coker.
Grayling. By H. D. Dean.
Preservation of Our Fish Fauna. By Henry B. Ward.
Recent Legislation on the Fur Seal Fishery. By C. H. Townsend.
Fishways for the Rank and File. By O. W. Buck.
Federal Control over Fish in Boundary Waters. By H. Hinrichs.

The following officers were elected for the coming year:

President, Dr. Charles H. Townsend, Director of the New York Aquarium.
Vice-President, Prof. H. B. Ward, University of Illinois.
Recording Secretary, Mr. Ward Bower, U. S. Bureau of Fisheries.
Corresponding Secretary, Dr. Geo. W. Field, Massachusetts State Fish Commissioner.
Treasurer, Mr. C. W. Willard, Westerly, R. I.

The 1913 meeting will be held in Boston, but the exact date has not yet been determined.

## SPECIES OF FISHES IN THE WORLD

Questions are frequently asked at the Aquarium concerning the number of species of fishes in this region, in North America and in the world. In any locality where the fishes have been well studied, it is an easy matter to answer such a question. Thus, within fifty miles of New York City there have been taken two hundred and thirty-nine species, according to Mr. John T. Nichols, of the American Museum of Natural History, who has carefully collected the records of occurrences. Of course, this number may be increased slightly in coming years, especially by the capture of marine wanderers accidental to our fauna.

The number of North American species can only be estimated somewhat roughly at present, for the reason that in many regions the fishes have not been studied with sufficient care. Jordan and

Evermann, in their Report upon the Fishes of North and Middle America, list about three thousand five hundred species. Since the appearance of this work a number of additional species have been described. How many fishes yet remained unknown, how many of those listed are pure synonyms or should be classed merely as variations, cannot be known until many more years of study have been given to the subject.

Mr. W. W. Henshaw, Chief of the Biological Survey at Washington, has recently published an estimate of the probable number of species of vertebrated animals in the world (*Science*, Sept. 6, 1912, p. 317) as follows:

| | |
|---|---|
| Mammals | 7,000 |
| Birds | 20,000 |
| Crocodiles and turtles | 300 |
| Lizards | 3,300 |
| Snakes | 2,400 |
| Frogs and toads | 2,000 |
| Salamanders | 200 |
| Fishes | 12,000 |
| Total | 17,200 |

As Mr. Henshaw points out, such estimates must necessarily be little more than guesswork, except, perhaps, in the birds and mammals which are better known than the other groups. In view of the fact that some three thousand five hundred fishes are listed for North American waters north of Panama, the total of twelve thousand for a world estimate appears rather small. To be sure, many species, especially of the ocean waters, are very widely distributed, and many undoubtedly yet remain to be placed in synonymy. Yet, when one considers the vast regions of the earth—central portions of South America, Africa and Asia, the islands of Oceanica and depths of the ocean, in all of which the fish fauna is very imperfectly known—it would seem that Mr. Henshaw's estimate is, to say the least, a very conservative one.

## NEW MEMBERS

*June* 6, 1912, *to October* 8, 1912

ANNUAL MEMBERS

Mrs. C. C. Auchincloss,
Mrs. Alvin W. Krech,
Mrs. Frederick H. Eaton,
Mrs. Joseph Palmer Knapp,
Mrs. E. LeGrand Beers,
Mrs. DeLancey Kane,
Dr. J. H. O'Connell,
Mrs. Augusta Booth,
Mrs. H. K. Pomroy,
H. C. Koehler,
Arthur B. Hunn,
Sidney J. Jennings,
James Timpson,
Maunsell S. Crosby,
M. M. Hansford,
Theodor A. Simon.
Baroness R. de Graffenried.

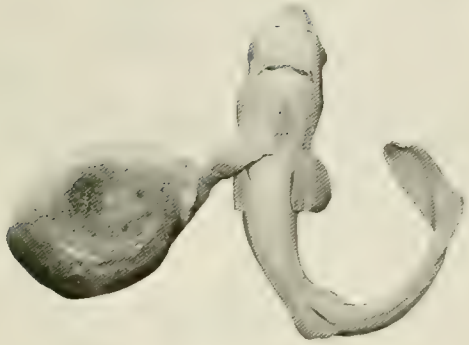
## THE GARDEN POOL AND THE MOSQUITO

IT IS a matter of common knowledge that many species of small fishes have a fondness for the larvae of the mosquito as an article of diet. The result of this is that open streams and ponds where fishes thrive never produce large numbers of this irritating and often dangerous pest. Unfortunately for humanity the mosquitoes are not as particular where they live as fishes are, and will thrive in many places unfitted for fish life. Apparently no puddle of water is too small or too foul to breed mosquitoes, while fishes, even catfishes and carp, have their limits. Any temporary mud-hole holding water for a couple of weeks may yield a plentiful crop of mosquitoes, and even a tin can, before it has time to go dry after a heavy rain, may furnish enough to cause a household considerable worry.

The rain barrel can be covered, the tin can emptied, the puddle drained or oiled, but what about the fountain and the lily pool, which, even in the heart of the city, is maintained for the beauty and interest, and apparently also for the mosquitoes it affords? The garden pool cannot be oiled like the stagnant marsh pool. To do so would destroy its beauty; to drain it dry enough to kill the mosquitoes would also mean the killing of the plant life contained in it. The one solution of the problem is the introduction of small fishes in sufficient numbers to destroy the wrigglers.

Without question, the best fish for this purpose, all things considered, is the goldfish. The common variety of goldfish is hardy and well suited by centuries of cultivation for life in such pools. They are easily obtained from dealers in fish and aquarium supplies and will stand shipment in a small amount of water better than most any other ordinary fish—and "commons" are cheap. A few small specimens introduced into a pool will be sufficient to keep the mosquitoes in check, for it has been shown by abundant evidence that the young goldfishes will select the wrigglers for food, even in the presence of various sorts of prepared fish foods.

In the fall, when the water is turned off to drain the pool, the fish may be transferred to indoor aquariums, or they may be returned to the dealer and a new supply purchased the following spring. The lily pond and fountain should not be permitted to become a nuisance to the household and the neighbors when the addition of a few common goldfishes will not only remove the mosquito larvae before they transform, but will at the same time render the pool much more attractive.



SPINY DOGFISH

Embryo still attached to the egg; reduced one half. Photograph by R. C. Osburn.

## FISHES THAT PRODUCE LIVING YOUNG

THE statement that some fishes bring forth their young alive is usually a startling one to the person who is not familiar with ichthyological lore. The common sorts of fishes, it is true, lay their eggs either broadcast in the water or in various makeshifts for nests, and the fertilization takes place after the eggs are laid. But in a number of groups the eggs are retained until the young are developed, and it is of interest that these viviparous fishes are often not closely related, but belong to widely separated families. The development of the life-bearing function in such unrelated groups forms one of the best examples of parallel evolution.

It is an equally interesting fact that most fishes that bear living young are closely related to others that reproduce in the usual manner; they are, therefore, individual species or genera which have adopted this mode of reproduction without undergoing a sufficient change in structural characteristics to separate them from the parent stock. Thus the sharks, rays and killie-fishes have representatives of both classes. The surf-perches (*Embiotocidae*) of the Pacific Ocean represent a single family in which all the members are live-bearing. Among the sharks, the majority of the species are viviparous, but the Port Jackson and bullhead sharks lay large eggs with tough, horny shells. The majority of the rays or skates lay eggs with horny shells, but certain members, as the sea-bat or sea-devil (genus *Manta*) and the butterfly ray (genus *Pteroplatea*) bring forth living young. Among the killie-fishes, the more common genera (*Fundulus* and *Zygonectes*) lay eggs, but in the genus *Gambusia*, etc., living young are produced.

In the viviparous sharks and rays, the eggs are very large—as large as those laid by their oviparous relatives. The eggs contain sufficient nutriment, or nearly so, to bring the young to a proper condition for birth and but little nourishment is ordinarily derived from the mother. In the live-bearing bony fishes where the eggs are small, the young receive their nourishment, or a portion of it at least, from the maternal tissues. In the surf-perches, particularly, as shown years ago by Professor Eigenmann, the eggs are reduced in size to such an extent that they contain very little yolk, the nourishment in this case being derived from the membranes of the mother. The eggs of the viviparous fishes are always comparatively few in number for very good reasons. First, since the young at birth are larger and more highly developed than those hatched in the ordinary way and so are better able to take care of themselves, it has not been necessary to produce such a large number in order to continue the species. Second, a larger number of young would be too great a strain upon the vitality of the parent, which must be preserved if the young are to be produced in good condition. It is as though each type of fish possesses a certain amount of energy for reproduction, which, in the case of egg-laying fishes, can be devoted to the production of a large number of eggs, but which in the live-bearing fishes is devoted to the special nourishment and protection of a much smaller number.

The common little shark, known as the dogfish, produces several young at a time. These, when born, are about eight inches in length, while the adult fish reaches not more than three feet. It will thus be evident that the younger generation is well on its way to maturity at the time of birth and has passed most of the dangers that surround the ordinary type of fish during its hatching and growth periods.

The surf-perches again seldom reach more than a foot in length, and bring forth a small number of young, which range in length according to the species from one and a half to two and a half inches, so these young are well on the way to maturity.

Among the killie-fishes, the top-minnow (*Gambusia affinis*) of our southern Atlantic States bears a larger number of young, but these at birth are only about one-third of an inch, while the adult mother reaches a length of about two inches. According to a recent article in *Science*, by Dr. Hugh M. Smith, the average number of young in families produced in June

is one hundred, individual cases ranging from eighty-five to one hundred and thirty-four. Dr. Smith suggests that two broods are produced in a season, since the young are known to make their appearance both in spring and late summer. The second brood is much smaller in number, consisting of about two dozen, ranging, in the fish examined by him, from eighteen to thirty.

The smaller fresh-water live-bearing fishes are easily kept and reproduce readily in captivity. They are, therefore, much in demand by fish fanciers and are among the most interesting of the many species of aquarium fishes.

## A FASTIDIOUS SPIDER-CRAB

ALL young spider-crabs decorate the carapace and legs in the attempt to render themselves less conspicuous in their environment (see the BULLETIN for November, 1911). The specimen figured in the accompanying cut exhibited rather unusual taste in the matter of color as well as in the selection of material. When brought into the Aquarium it was covered with scraps of seaweed. It was placed in a tank in which there were few weeds, but a great many small, orange-colored anemones (*Sagartia leucolena*) attached to pebbles. Apparently perceiving that algae were no longer in style, the crab in a short time discarded them and proceeded to adorn himself with the anemones. The polyps seemed as well contented on the crab as they did on the stones, expanding and feeding as well as though it were their natural habitat. At the time the photograph was made, the crab, which was a trifle over an inch long, was carrying eleven anemones about with him.

## THE SWORDFISHING INDUSTRY

ACCORDING to the *Fishing Gazette* the swordfishing has been better the past summer than for many years. At Boston, where nearly all of the swordfish catch is landed and marketed, seven hundred and seven were brought in in one day, and on one other day six hundred and eighty-four of these big fishes were landed at T Wharf, the fishing dock. One schooner brought in two hundred and two at one time. This is a profitable business when one considers that the average weight of the fish is about two hundred pounds, and that they bring usually from eight to eleven cents a pound. The total quantity landed at Boston during the month of July, 1912, was 1,014,350 pounds, valued at $93,370, or a little over nine cents a pound.

SPIDER-CRAB
Decorated with sea-anemones; slightly reduced.
Photograph by R. C. Osburn.

The swordfish is the largest fish, except the great tuna, regularly taken for market. Individuals weighing over four hundred pounds are rarely taken, but there is a record of one weighing seven hundred and fifty pounds.

They are occasionally taken on trawl lines, but the harpoon is the usual means of capture. They usually swim near the surface, above which the dorsal fin often projects. A sailor at the masthead keeps watch for these signs, and when a fish is sighted the fishing vessel approaches until the harpooner on the "pulpit," a small framework at the end of the bowsprit, is within striking distance. To the head of the harpoon is fastened a light rope with a keg made fast to the end to serve as a float.

After the fish has tired himself out in his struggles to escape from the harpoon and the float, the fisherman approaches in a dory and finishes him with a lance. Not infrequently, however, the fish retaliates by attacking the boat with his sword. The strength of the infuriated fish is such that the sword will easily pierce the bottom of a skiff, or even of a schooner, for that matter, as the records abundantly testify. I recall seeing a skiff which had been struck in such a manner that the sword went completely through the boat, piercing both sides.

The favorite fishing grounds are the off-shore waters from Block Island to Cape Cod and northward, and it is no uncommon sight on passing the region about No Man's Land, off Martha's Vineyard, or the Nantucket Shoals, to see numbers of small fishing vessels, equipped for swordfishing, cruising about with a man at the masthead on the lookout for swordfish. The small schooners and sloops which engage in other fishing at other seasons of the year generally carry swordfish tackle, and often when on other business are ready for a try at the big fish.

## THE BIG GROUPERS

SMALLER specimens of the Spotted Grouper or Jewfish (*Promicrops guttatus*) have lived remarkably well at the Aquarium, so it appeared probable that adults would do equally well. Consequently about a year ago a two-hundred-and-fifty-pound specimen was brought from Key West, Florida, as a gift from Mr. Danforth B. Ferguson.

Up to that time this was the largest bony fish ever exhibited at the Aquarium, and the largest fish of any kind with the exception of an occasional large shark. On account of its size this specimen could not be accommodated in a wall tank with the other groupers, but was placed in the large center pool with the sturgeons, drumfishes and sand sharks.

On April 13, 1912, six more large groupers, most of them considerably larger than the first, were brought from the same locality and placed in the same pool. One of these died on September 8th, and though by no means the largest of the lot, it measured six feet three inches in length, and weighed, in a very emaciated condition, two hundred and thirty pounds.

Though accustomed in their natural habitat to very pure sea-water of a high salinity, they have adapted themselves well to the harbor water supplied to the center pool, which has only half the salinity of pure sea-water and which is filthy beyond comparison with that of the Florida Keys.

It is thus demonstrated beyond question that these giants among the finny tribes are hardy and adaptable in confinement, and we predict that they will become popular as aquarium exhibits in other institutions than our own.

## OUR BLACK-SPOTTED TROUT

THE trouts of western North America present an exceedingly difficult problem for the systematist, and authorities on the group are by no means agreed as to the status of many of the forms which have been variously regarded as species, varieties or merely local phases.

The cut-throat or black-spotted trout, like most of its relatives, is extremely variable, and as its range is very great, extending from Alaska to California and from the head-waters of the Yellowstone to the Pacific, some widely different conditions or habitat are presented. It may be that some of these differences are due to direct effects of the environment, but probably the modern students of heredity would regard the species as one possessed of a great complex of characters, which, under geographical isolation, have become segregated or sorted out in various ways to produce the variations in color, etc., which are observed.

The trout of Yellowstone Lake and neighboring waters was originally described as a separate species, *Salmo lewisi*, in honor of Captain Meriwether Lewis, the leader of the Lewis and Clark expedition. Later it was considered a variety of *Salmo clarki*, the cut-throat or black-spotted trout. All the tendency of recent years has been to merge it completely with *clarki*, and drop the varietal name.

The manner in which the species has become distributed in the head-waters of the Yellowstone from the Snake River by way of Two-Ocean Pass, has been interestingly described by Dr. B. W. Evermann. It appears that the cut-throat trout is the only species of fish inhabiting the waters of Yellowstone Lake. Certain other species have been introduced, but according to Messrs. Thompson and Leach, of the United States Bureau of Fisheries Stations at the lake, none of those introduced are ever taken, so it is presumed that they have failed to adapt themselves to these waters.

Every summer the Aquarium receives eggs of the cut-throat trout through the kindness of the United States Bureau of Fisheries, and the past season the writer had the privilege of seeing the work of taking the eggs at the lake stations. The Yellowstone trout, like most lake-dwelling trout, run into the shallow waters to breed, and where possible ascend the small streams which empty into the lake. Often the way is barred by shallows in the streamlets, but, undismayed by difficulties that ordinarily they would not attempt, the fishes, prompted by the breeding instinct, attempt to pass over ripples so shallow that swimming is impossible, and progress must be made, if at all, by a series of flops and struggles over the uneven gravel and stones of the stream bed. The writer observed one such shallow, where, in perhaps the space of a square yard, about a dozen trout were attempting to pass by this method from one pool to the next higher. The water was so shallow that the fishes were more than half exposed to the air, and were compelled to lie on one side between struggles. Occasionally a fish would flop out upon the dry gravel. However, the large number of fishes in the pool above proved that many, if not all, that made the attempt had been successful. In some pools the fish were so numerous as to render the bottom scarcely visible, and to capture them to obtain eggs meant only dipping them out with a hand-net.

The morning before my arrival at the lake, Mr. Thompson had taken three hundred thousand eggs. The Yellowstone trout yield on the average not more than one thousand eggs, so to secure the above number it had been necessary to strip at least three hundred females. After fertilization, the eggs, which are orange in color and about the size of small peas, are placed two or three layers deep in wooden trays with a wire screen bottom, and the trays are set in running water.

The eggs when in this condition do not stand transportation as well as they do after the embryos have partially developed, so they are kept at the lake until they are eyed, that is, until the eyes af the developing embryos are visible as black specks in the eggs. In this condition they may be shipped, with proper care as to temperature and handling, to any part of the world. For transportation from the lake the trays are packed in ice in the shipping crates and hauled by express wagons sixty-five to seventy miles to the nearest railroad station at Gardiner, Montana. From here they go by rail, usually to the United States Fisheries Stations at Bozeman, Montana, and Spearfish, South Dakota, for further hatching, or they may be shipped elsewhere. All that is required is that the eggs be kept moist and the temperature low.

The eggs received at the New York Aquarium make, first, the long drive out of Yellowstone Park, then a twenty-five hundred mile trip by rail. On their arrival the trays are again placed in running water, maintained at a proper temperature, and the process of development, which has been delayed by the cold during the shipment, goes forward again to its completion.

Up to the period when the young fishes are planted in streams and lakes to look after themselves, the work of the fish culturist, the product of modern scientific methods, is far more certain of its results than is the work of the agriculturist or horticulturist. When our visitors view the black-spotted trout hatched and reared in the Aquarium, we beg that they will recall not merely the long journey, but also the scientific studies that have made possible such results.

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## THE ORANGE FILEFISH

ONE of the most unique fishes of our fauna is the Orange Filefish (*Alutera schoepfi*), known also by a variety of local names, such as foolfish, leather-jacket, hambag-fish, old maid, living skeleton and sunfish. The name filefish is derived from the serrated character of the dorsal spine, which is somewhat like that

JAWS OF ORANGE FILEFISH

Jaws, fully opened, and teeth of Orange Filefish, enlarged about one-half. Photograph by R. C. Osburn.

of the trigger-fishes, to which the species is closely related. The term foolfish was undoubtedly applied on account of the peculiar facial expression, and the actions of the fish in swimming tend to strengthen the application.

The color of the adult fish is usually a light orange overlaid with irregular brown blotches, but a great amount of variation is observed, and sometimes when the brown is wanting the fish has a startling resemblance to an animated omelet. The filefish, along with the trigger-fishes, has been cited as an example of warning coloration, their striking hues being supposed to signal the fact that the flesh is poisonous. The scales are very small and covered with sharp prickles which give to the skin a texture not unlike the shagreen of the shark.

In form the fish is very deep and extraordinarily thin so that the prominent features of the skeleton are often observable externally, and the common name living skeleton is rather appropriate. The upper part of the head is remarkably retracted so that the eye is situated almost under the dorsal spine and above and posterior to the gill opening and the pectoral fin, while the latter is anterior to the hinder end of the very oblique gill opening. The lower jaw is protruded to such an extent that its teeth are directed strongly backward.

The position of the small mouth is such that the fish must assume very unusual positions in feeding. In nature they find their food about piles, rocks and in similar situations, and they feed upon corals, hydroids, bryozoa, mollusks, crustacea, seaweed, etc., which they cut up by means of the sharp, incisor-like teeth. Only when the food is above them can they take it in a horizontal position; if it is in front of them they must turn obliquely downward, while if it

it is below them they must stand on their heads to secure it. In the Aquarium they may be even seen to turn partly over backward to pick food from the bottom. Mr. W. I. DeNyse, who has observed them feeding in nature, informs me that these positions are habitual with them. The teeth of the filefish are very peculiar, but well adapted to the function of cutting. In the lower jaw there is a single series of sharp-edged incisor-like teeth. These are opposed to a double row of teeth in the upper jaw which are so arranged that they present a single cutting edge. The lower jaw closes inside of the upper in such a way that an admirable pair of shears is formed, and the trenchant function is further increased by the serrated edge.

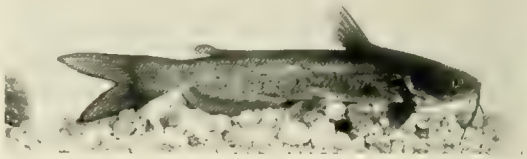
The bones forming the bases of the fins are very strong, especially the anterior ones of the dorsal and anal series, which are remarkably enlarged. The pelvic fins are entirely wanting, but the pelvic girdle is modified to form a strong brace consisting of a single bone extending from between the jaws, where it is attached, the full length of the abdomen, to which it lends support and protection. The ribs are short and very strong and are broadened posteriorly to overlap, suggesting the uncinate processes of the ribs of birds.

In the Aquarium the tail is used almost entirely as a rudder, and progress is made in an awkward-appearing fashion by means of sculling with the pectoral fins and by the undulatory motion of the dorsal and anal fins. These movements are reversed in swimming backward. When rapid progress is desirable the tail is used in the manner usual in fishes.

While the orange filefish is known from the Gulf of Mexico to Cape Cod, and even as far north as Salem, Mass., it is naturally a fish of the warmer seas and is found in this region only during the warmer months. Whether they migrate southward, or are killed by the cold at the approach of winter, is not known. The young, three inches and over, are fairly common along the coast of Long Island and southern New England every summer, especially in September, but the adults are more rare. A few adults are usually taken each season at Gravesend Bay and at Woods Hole, Mass., but occasionally several years will pass without the capture of a single specimen. The present season has been unusual in the appearance of large numbers of adults at Gravesend Bay; as many as seventy-five or eighty being taken at a single haul of a pound net.

The filefish reaches a maximum length of two feet, but the largest taken in this region measured about eighteen inches. They present a rather bizarre appearance in the Aquarium, and their peculiar and awkward movements seem to have a greater attraction than usual for our visitors. While the adults live fairly well, considerable difficulty has been experienced in handling the young, and it has not been possible to keep them more than a few months. Probably the difficulty lies with the character of the food, although the diet has been varied as much as possible in the attempt to rear them to maturity.

The filefishes have no economic importance for the scanty flesh is bitter and offensive to the taste, and it is not improbable that it is impregnated with a poisonous alkaloid. Such poisons are known to exist in the nearly related triggerfishes, some of which are so noxious as to cause a severe disease, ciguatera, which not infrequently results fatally both to man and lower animals.



COMMON SEA CATFISH

## AQUARIUM NOTES

*Tarpon.*—A splendid mounted specimen of the tarpon has been presented to the Aquarium by Mr. H. Casimir de Rham, Member of the Board of Managers of the New York Zoological Society. The fish, which weighed one hundred and sixty-five pounds, was taken by Mr. de Rham with rod and line at Bahia Honda, Florida.

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*Aiding Investigators.*—During the past year the Aquarium has been able to aid biological research in a number of ways. Owing to lack of laboratory space and proper equipment but little such work can be carried on within the walls of the Aquarium building. Mr. George G. Scott of the College of the City of New York, however, has pursued certain investigations on the blood of fishes in an improvised laboratory.

Dr. Jacques Loeb, of Rockefeller Institute, has been supplied with large numbers of killiefishes for use in the investigation of certain biological problems. Prof. C. F. W. McClure, of Princeton University, has been furnished with the eggs and embryos of salmonoid fishes for the completion of studies on the origin and development of the lymphatic vessels.

RED HIND

Dr. G. A. MacCallum, of New York City, has been for some months examining the diseased and dead fishes for the purpose of determining the nature of fish diseases and the cause of death, and especially to study the parasites of the fishes in the Aquarium.

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*Porpoises and Dolphins.*—Numerous attempts have been made to secure these small toothed-whales in good condition for exhibition at the Aquarium. On several occasions specimens of both have been taken in local waters and placed in the large center pool, but they have always appeared to be injured before their arrival and never have lived more than a week or so.

The last such attempt was made a short time ago when a specimen of the common dolphin was captured in a pound-net at Holly Beach, N. J., and brought to the Aquarium on September 11th. It was evidently nearly dead on arrival, but it survived for two days.

On two occasions we have tried to secure specimens of the porpoise through the cooperation of the porpoise fishery at Cape Hatteras, N. C., the only such fishery on our coast. The first time none were secured. Last winter a second attempt was made and several fine specimens were captured and shipped. The worst blizzard of the season was then raging on the coast and transportation was delayed at a time when it was impossible to protect the animals properly. The result was that all were chilled and none of them reached New York alive.

It would seem that the Fates have decreed against us in regard to these animals. However, not being predestinationists in this respect, we have decided to renew our efforts and another trial to obtain porpoises from Hatteras will probably be made during the coming fall or winter, in the hope that persistence may be crowned with success.

*Stored Sea-Water Analysis.*—There is in the storage reservoir at the Aquarium a supply of water varying from sixty thousand to seventy thousand gallons brought in from the open sea for the benefit of our tropical fishes, since these forms, as a rule, do not live well in the brackish and filthy harbor water. The reservoir was filled in July, 1908, and since that time the water has not been entirely renewed, although twenty thousand to twenty-five thousand gallons are added yearly to make up for losses due to waste. It is a fact forcibly impressed upon the management of the Aquarium that corrosion is constantly taking place in the lead-lined and galvanized piping and the bronze pumps through which this sea-water is circulated. Fearing that there might have been an accumulation of lead, zinc or copper salts in solution to a degree that would be poisonous to the fishes, it was determined to have the water analyzed.

COWFISH

The vertical fins often assume very unusual positions in sculling slowly about the aquarium tank.

Dr. Otto Kress, of the Department of Chemistry of Columbia University, undertook the analysis, and his results showed that in spite of the corrosion there has been no increase in such poisonous salts in the water. There is thus no reason to fear that the very considerable chemical action of the warm sea-water upon our piping and pumps can prove a source of danger to the fishes.

The thanks of the New York Zoological Society are due Dr. Kress for his kindness in making the analysis.

*The Large Turtles.*—Both the green and loggerhead turtles live well in captivity, no matter what their age, provided, of course, that they have sustained no injuries in capture or during transportation.

There are at present twelve green turtles of various sizes in the New York Aquarium. The smallest weighs not more than ten pounds, the largest about four hundred. One specimen from the South Pacific Ocean was brought around Cape Horn in a sailing vessel and presented to the Aquarium in 1898. It is in excellent condition after fourteen years of confinement.

One loggerhead was received on August 29, 1900, and is still on exhibition. This specimen weighs about four hundred and fifty pounds, the largest loggerhead ever seen at the Aquarium. Several others weigh in the neighborhood of two hundred pounds, and the smallest one weighs about fifty.

The smaller hawk's-bills live well, but larger ones, seventy-five to one hundred pounds, appear to be unable to adapt themselves to the conditions of life in captivity and can seldom be induced to take food.

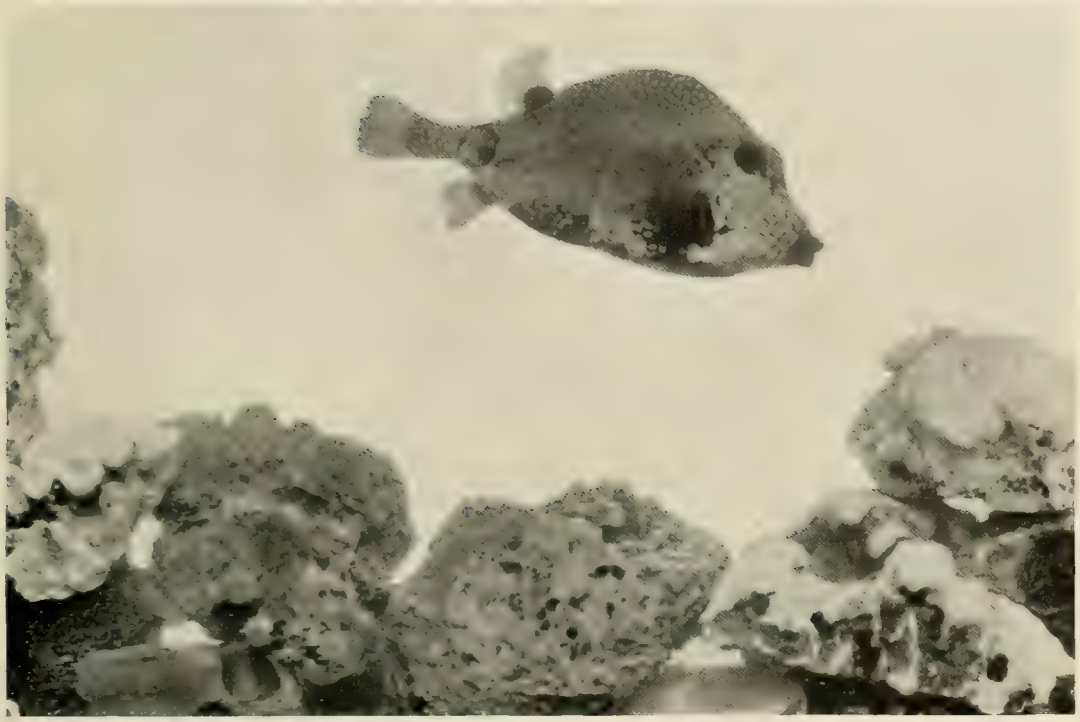
Leatherbacks have been tried on several occasions, but the attempt to keep them has always resulted in failure. They swim continually, will take no food and soon weaken and die. Possibly very young individuals might give different results, but these we have not been able to obtain.

All the larger turtles are kept in the harbor water, though in nature they live in the purest sea-water of the open ocean.

*Other Aquariums.*—American cities have been slow to perceive the importance of the public aquarium as a means of entertainment and

TRUNKFISHES

The humpbacked Buffalo Trunkfish, the common Trunkfish and the horned Cowfish are all represented in the same tank.



TRUNKFISH
The body is encased in an armor of bony plates.

and instruction, but recently the idea seems to have taken hold in a number of centers. For many years New York City stood alone in this respect among the cities of the United States, although its aquarium has continually demonstrated the great popularity of such institutions from its opening day in December, 1896.

The Detroit Aquarium was opened to the public in 1904, and although it is rather inaccessibly situated on Belle Isle, several miles from the city, the attendance for the past year exceeded the million mark. This aquarium, located nearly eight hundred miles from the sea, nevertheless maintains a fine collection of marine fishes by means of a storage system and has thoroughly demonstrated the practicability of the inland salt-water exhibition.

In Philadelphia a temporary aquarium was opened in Fairmount Park on November 25th, 1911, in one of the old water-works buildings. Although possessing but nineteen tanks, in which only fresh-water fishes are exhibited, this aquarium has thoroughly justified its existence, and in the ten months from the time of its opening to October 1st, 1912, two hundred and sixty-six thousand three hundred and thirty-eight visitors viewed the exhibitions. A salt-water aquarium one hundred feet by fifty feet is in process of construction, with provision for thirty tanks, and will be occupied before the end of the year. Mr. W. E. Meehan, formerly State Commissioner of Fisheries of Pennsylvania, is the superintendent.

At Boston a new city aquarium has just been completed and will be opened to the public within a few weeks. Provision has been made for both salt and fresh-water exhibitions. Mr. L. L. Mowbray, formerly in charge of the Bermuda Aquarium, has been made superintendent of the Boston Aquarium, and Mr. A. O. Featherstone, for more than eleven years an employee of the New York Aquarium, has accepted an advanced position in the Boston institution.

*Key West Fishes.*—An unusually fine lot of fishes arrived at the Aquarium on October 9th from Key West. Altogether there were three hundred and fourteen specimens of fishes, representing forty-three species, besides conches and starfish. The following list will show the great variety of forms represented in the collection: Nassau, red, yellow-fin and black groupers; mutton-fish; snook; margate; black, blue and queen angel-fishes; spadefish; spot and gray

SPADEFISHES IN THE NEW YORK AQUARIUM
These cross-barred beauties are graceful swimmers.

snappers; common and salmon rockfish; common and buffalo trunkfish; cowfish; butterfly-fish; rock and red hinds; trigger-fish; porgy; white, gray, yellow and blue-striped grunts; squirrel-fish; schoolmaster; rainbow parrot-fish; red and Spanish hogfishes; porkfish; brown and green morays; filefish; yellowtail; Bermuda chub; scorpion-fish; surgeon-fish; remora or shark-sucker; southern puffer or swellfish, and sea catfish.

All of these except the buffalo trunkfish and the queen angel-fish have been exhibited before in the Aquarium. Some of these will eventually be placed in the new Boston Aquarium, when the salt-water tanks there are completed. In the meantime, they are all being cared for in the New York Aquarium and a large proportion will remain on exhibition here. The collection was made and cared for during transportation by Mr. L. L. Mowbray, Superintendent of the Boston Aquarium.

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BULLETIN No. 6.—Wanted, one copy.

*The Giant Salamander.*—After the lapse of several years, the largest species of amphibian known to the modern world is again represented in the collections of the New York Aquarium. The species, *Megalobatrachus japonicus,* is a native of Japan, and is a veritable giant among recent amphibians, reaching a length of about three feet.

Some of the early ancestors of the group were as large as alligators, but with the exception of this one all the modern species are small, most of them reaching a length of only a few inches.

Aside from the mere fact of size, the species is interesting to the student of geographical distribution because its only near relative is the common hellbender (*Cryptobranchus alleghe-niensis*) of the Ohio River drainage. Evidently these two species are the last representatives of a group which once had a world-wide distribution.

The specimen at present in the Aquarium is about two feet long. The giant salamander lives well and has even been known to breed in captivity.

# GENERAL INFORMATION

## MEMBERSHIP IN THE ZOOLOGICAL SOCIETY

Membership in the Zoological Society is open to all interested in the objects of the organization, who desire to contribute toward its support.

The cost of Annual Membership is $10 per year, which entitles the holder to admission to the Zoological Park on all pay days, when he may see the collections to the best advantage. Members are entitled to the Annual Reports, bi-monthly Bulletins, Zoologica, privileges of the Administration Building, all lectures and special exhibitions, and ten complimentary tickets to the Zoological Park for distribution.

Any Annual Member may become a Life Member by the payment of $200. A subscriber of $1,000 becomes a Patron; $2,500, an Associate Founder; $5,000, a Founder; $10,000, a Founder in Perpetuity, and $25,000, a Benefactor.

Applications for membership may be handed to the Chief Clerk, in the Zoological Park, Dr. C. H. Townsend, N. Y. Aquarium, Battery Park, New York City, or forwarded to the General Secretary, No. 11 Wall Street, New York City.

## ZOOLOGICAL PARK

The Zoological Park is open every day in the year, free, except Monday and Thursday of each week, when admission is charged. Should either of these days fall on a holiday no admission fee is charged. From May 1 to November 1, the opening and closing hours are from 9 o'clock A. M. until one-half hour before sunset. From November 1 to May 1, the opening and closing hours are from 10 o'clock A. M. until one-half hour before sunset.

## NEW YORK AQUARIUM

The Aquarium is open every day in the year: April 15 to October 15, from 9 o'clock A. M. to 5 o'clock P. M.; October 16 to April 14, from 10 o'clock A. M. to 4 o'clock P. M. No admission is charged.

## PUBLICATIONS

The publications of the Society are for sale at the prices affixed below. Address H. R. Mitchell, Chief Clerk, New York Zoological Park.

| | | | |
|---|---|---|---|
| First Annual Report | | Paper | $ .40 |
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| Zoologica Vol. I. Nos. 1-7 inc. (Beebe), the Set | 1.30 |
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Publications and Post Cards of the Aquarium may be obtained by writing Dr. C. H. Townsend, Director, Battery Park, New York City.


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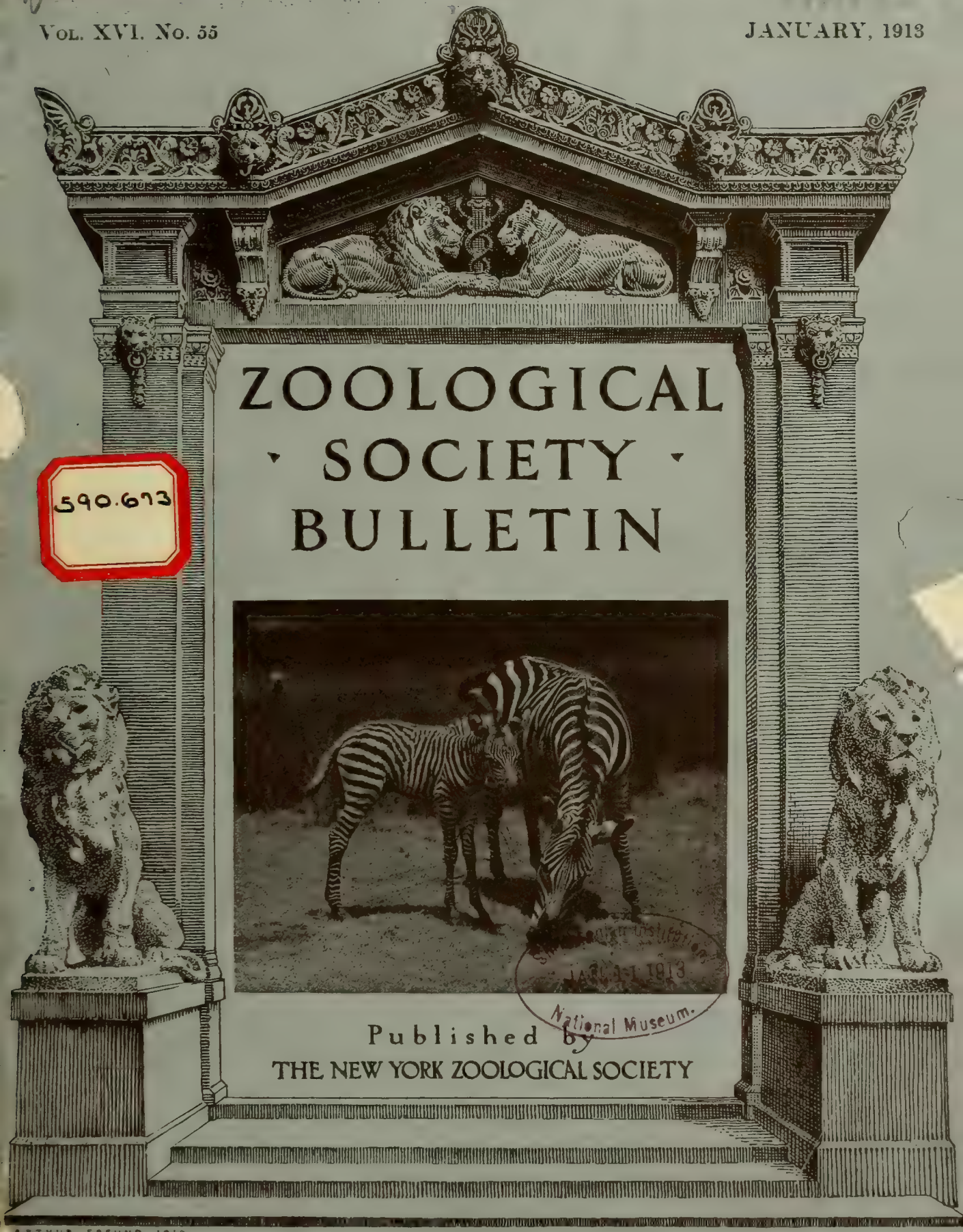

# ZOOLOGICAL SOCIETY BULLETIN





Published by
THE NEW YORK ZOOLOGICAL SOCIETY

ARTHUR FREUND 1912

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# ZOOLOGICAL SOCIETY BULLETIN

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THE ZEBRA HOUSE, AS SEEN FROM THE SOUTH, IN DECEMBER

# ZOOLOGICAL SOCIETY BULLETIN

*Published by the New York Zoological Society*

VOL. XVI JANUARY, 1913 NUMBER 55

## THE WILD EQUINES OF THE ZOOLOGICAL PARK

*By* HENRY FAIRFIELD OSBORN.

NOTWITHSTANDING the fact that the domestic horse has been the familiar servant of man ever since the earliest historic times, several of the most interesting forms of the wild equidae have remained, until only yesterday as it were, absolutely unknown to science. That the finest of all zebra species, the Grevy, should have thus remained wholly unknown until near the end of the nineteenth century, seems almost incredible; and it may

FIG. 1. HERD OF PRZEWALSKY WILD HORSES IN THE ZOOLOGICAL PARK

The original stallion and mare to the left. The small colt, born June 8, 1912, is of uniform buff color with a woolly coat. Photographed June 20, 1912.

FIGS. 2 AND 3. THE PRZEWALSKY STALLION

Showing the light buff muzzle, deep dun coloring, erect black mane, short ears and small, inexpressive eyes similar to those depicted by the artists of the Old Stone Age of France. The back view shows the dark brown dorsal stripe carried down on the upper portion of the tail, which is covered with short, dun-colored hair.

well stand as a warning that even now other species may remain to be discovered.

The living wild equines of the world are confined to Africa and Asia. The area inhabited by them extends from the Cape of Good Hope throughout the eastern half of Africa, and from Egypt northeastwardly to the geographical center of Asia, at Lake Baikal. In Africa the range of the zebras and asses is practically continuous from Cape Colony to Suakin, on the Red Sea, but in Asia, the wild equines now occur in isolated areas, sometimes rather widely separated.

Viewed from any point that may be chosen, the wild equines of the world form a zoological group of paramount interest to mankind, and well worthy of the great effort that has been made in the Zoological Park adequately to set it forth for the benefit of the public.

After two years of careful study and construction, the new Zebra House was opened to the public on November 15, 1912, with a really remarkable collection of wild horses and zebras, and one species of Asiatic ass. All the animals are in fine physical condition and the Przewalsky wild horse and the Grant zebra are breeding regularly. The wild horse is accustomed to the rigorous climate of northern Asia, to much greater extremes of temperature than those which it experiences in the Park. On the other hand, the Grant zebra has been taken from the plateau country of Africa, directly under the Equator, and its acclimatization and fertility in the Zoological Park are matters of great interest.

A complete list of the wild equines now or very recently shown in the Park, and the principal geographic range of each, is as follows:

| | |
|---|---|
| WILD HORSES. | Przewalsky Horses, *Equus przewalskii.* Desert of Gobi, Central Asia. |
| WILD ASSES. | Persian Wild Ass, *Equus hemippus.* Deserts of S. Persia, and Arabia. |
| | Kiang, *Equus hemionus.* N. Asia; Trans-Baikal Region. |
| ZEBRAS. | Grevy Zebra, *Equus grevyi.* Abyssinia and Br. E. Africa. |
| | Grant's Zebra, *Equus granti.* British East Africa. |
| | Chapman Zebra, *Equus burchelli chapmani.* Central South Africa. |
| | Mountain Zebra, *Equus zebra.* Cape Colony, S. Africa. |

*The Przewalsky Wild Horse,* otherwise known as the Steppe horse, and nearest relative of the domestic horse, is readily distinguished from all modern domesticated breeds by the entire absence of the forelock and by the fact that the mane rises along the neck like a crest exactly as in the zebras and asses, and does not fall over on one side, as in the domestic horse. The large head, rather short and truly horse-like ears, small and inexpressive eyes, and light buff-colored muzzle are well shown in Fig. 2. The body is uniformly colored, with a dark brown dorsal stripe. Sometimes there are faint horizontal stripings on the legs.

Another very distinctive feature, well shown in Fig. 3, is the short, stiff hair on the upper

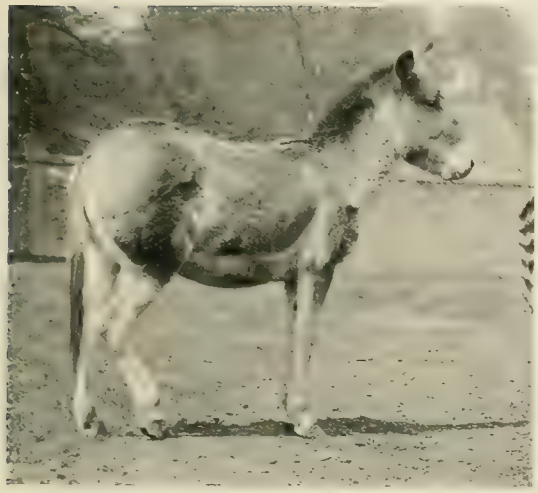


FIG. 4. THE KIANG, OF TIBET

From photograph by the Duchess of Bedford, made in Woburn Park

FIG. 5. PRZEWALSKY STALLION IN HIS WINTER COAT

The heavy beard, and the thick, hairy covering of the body, tail and feet, are well adapted to the rigors of the north Asiatic climate.

portion of the tail, of buff or dun color, traversed by the vertical stripe. There is a vast difference between the short, smooth and rather handsome coat of these animals in summer and the rough, shaggy coat of the winter, when a long beard appears beneath the jaws.

These animals were formerly widely spread over Europe, between twenty and twenty-five thousand years ago. During the Ice Age, they were among the favorite subjects of the cave men, who represented them with extraordinary fidelity as to all the features we have mentioned, on the walls of the caves of the Pyrenees, and of Dordogne and northwestern Spain. Not one of these drawings shows a forelock, and it is remarkable how those prehistoric artists portrayed the rather dull eyes in contrast with the fierce expression they gave the eyes of the bison.

The general dun or light-brownish color of the Przewalsky horses conforms to their semi-desert environment, rendering them less conspicuous, like the now extinct quagga of the Zebra family, which formerly roamed the open plains south of the Limpopo River in the Transvaal, South Africa.

But the closest imitation of the wild horse is in the wild ass (Fig. 4) from the Trans-Baikal of Asia, known as the *Kiang,* a specimen of which was presented to the Society by His Grace the Duke of Bedford. The light under-color of the belly of the wild horse is also seen in the wild ass of Southern Asia (Fig. 6) which has a much lighter color scheme than that of the Przewalsky. Its limbs are also light instead of being dark. It shows, too, the dark, erect mane and black stripe down the back. In fact, this black stripe down the back so well shown also in the back view of the Grevy Zebra (Fig. 8), is the most universal of all the color markings in the family of horses.

THE PERSIAN WILD ASS, *Equus hemippus*

FIG. 6. Uniform Isabella, or faun-color, with dark dorsal stripe, light colored and slender limbs, light under color and dark, erect mane. This animal differs from the Abyssinian ass, the progenitor of the domesticated asses, in the absence of the shoulder stripes.

It is difficult to conjecture what advantage this dark brown or black line brings to the animal. In all the accompanying photographs it appears to shade off into the background.

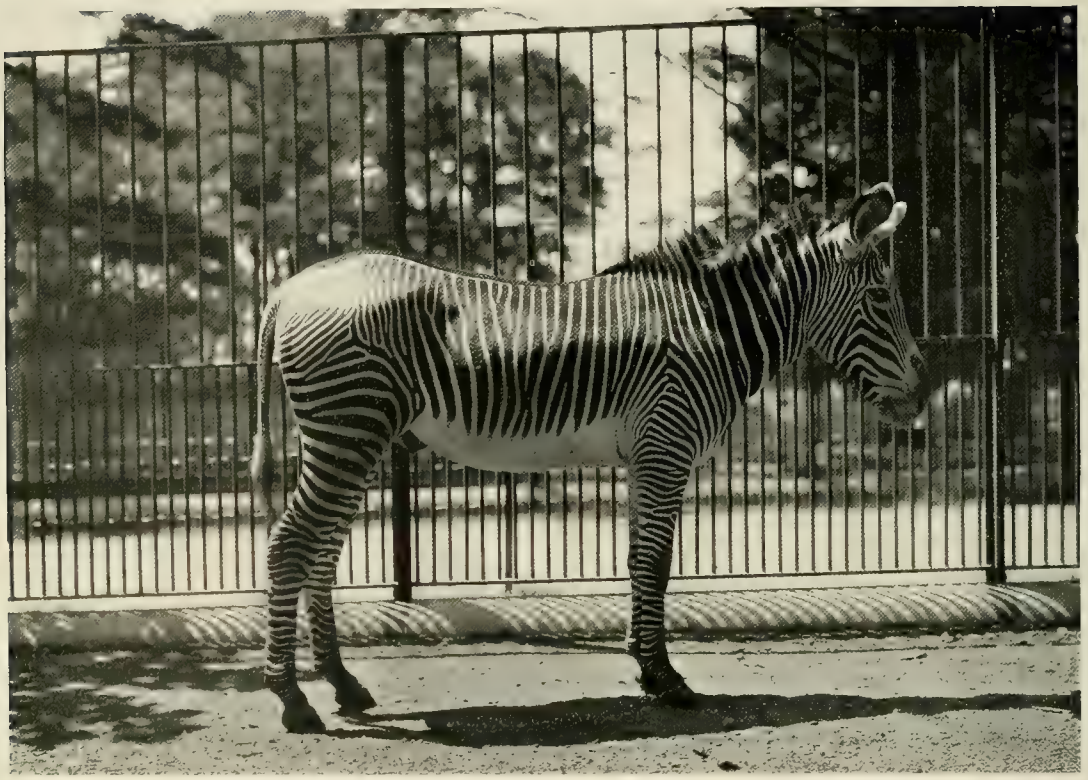


FIG. 7. THE PRINCE OF THE ZEBRA FAMILY, *Equus grevyi*

THE GREVY ZEBRA, FROM ABYSSINIA

FIG. 8. Distinguished by sharply defined and very numerous narrow white and dark chocolate stripes, and by a very heavy dorsal stripe which is continued down the center of the tail.

The very brilliant dark-brown stripes of the Grevy zebra, shown in Fig. 7, certainly tend to make the animal very conspicuous as seen in its yard; but from certain points of view, such as that of Fig 7, where the sunshine glances off the glistening hair, the white and brown stripes on certain regions of the body entirely disappear. Those who strongly believe in the color protection theory truly point out that in certain surroundings this most brilliantly marked of all the mammalia almost disappears from human vision. I myself have seen a small herd of Grevy Zebras standing under a tree in the Duke of Bedford's Park, Woburn Abbey, with the sunshine glistening down on them against a light background, become almost invisible. The vanishing effect is only transitory, however, and from other points of view they again become conspicuous.

*The Grevy* is readily distinguished as the largest of the zebras. It is characterized by delicate striping, a very long head, and very large, rounded ears, like those of many other forest-loving animals. Its narrow striping contrasts very strongly with the broad and brilliant

FIG. 9. THE ACCLIMATIZATION OF THE GRANT ZEBRA, *Equus granti.*

Mare, and foal born July 17, 1911. The mare shows the black muzzle, diamond-shaped pattern of the star on the forehead, black, erect mane, which extends back into the thin dorsal stripe and broad gridiron over the hips. The slender limbs of the zebra colt have nearly the same length as the limbs of the mother, although the body is very much shorter. This enables the colt to keep pace with its mother in escaping the attacks of the lion, the chief enemy of the Grant zebra.

stripes of the Grant zebra, which, as shown in Figs. 9 and 10, so completely surround the body that they unite with a black line extending along the under surface of the belly. Grant's zebra, like the Grevy, has a very conspicuous set of horizontal stripes extending down the legs to the hoofs, and is thus readily distinguished from the Chapman zebra in which the lower portion of the leg is quite pale.

*The Grant* is typical of a very large group entirely distinct from the Grevy and Mountain zebras. It is broadly known as the Burchell group, the type of which was the zebra found and described by the English explorer Burchell north of the Orange River, which roamed north of that stream as the Quagga roamed to the south. In the typical Burchell zebra (*E. burchelli,* now believed to be quite extinct) the entire legs are devoid of stripes, so that the zebras of the Burchell group from the Grant zebra on the extreme north of British East Africa to the extinct Quagga of the Cape of Good Hope region, once presented a complete color transition from the universal striping in

FIG. 10. GRANT'S ZEBRA, *Equus burchelli granti.*

Showing the broad striping, and the thoroughness with which the striping of the legs is carried down to the hoofs.

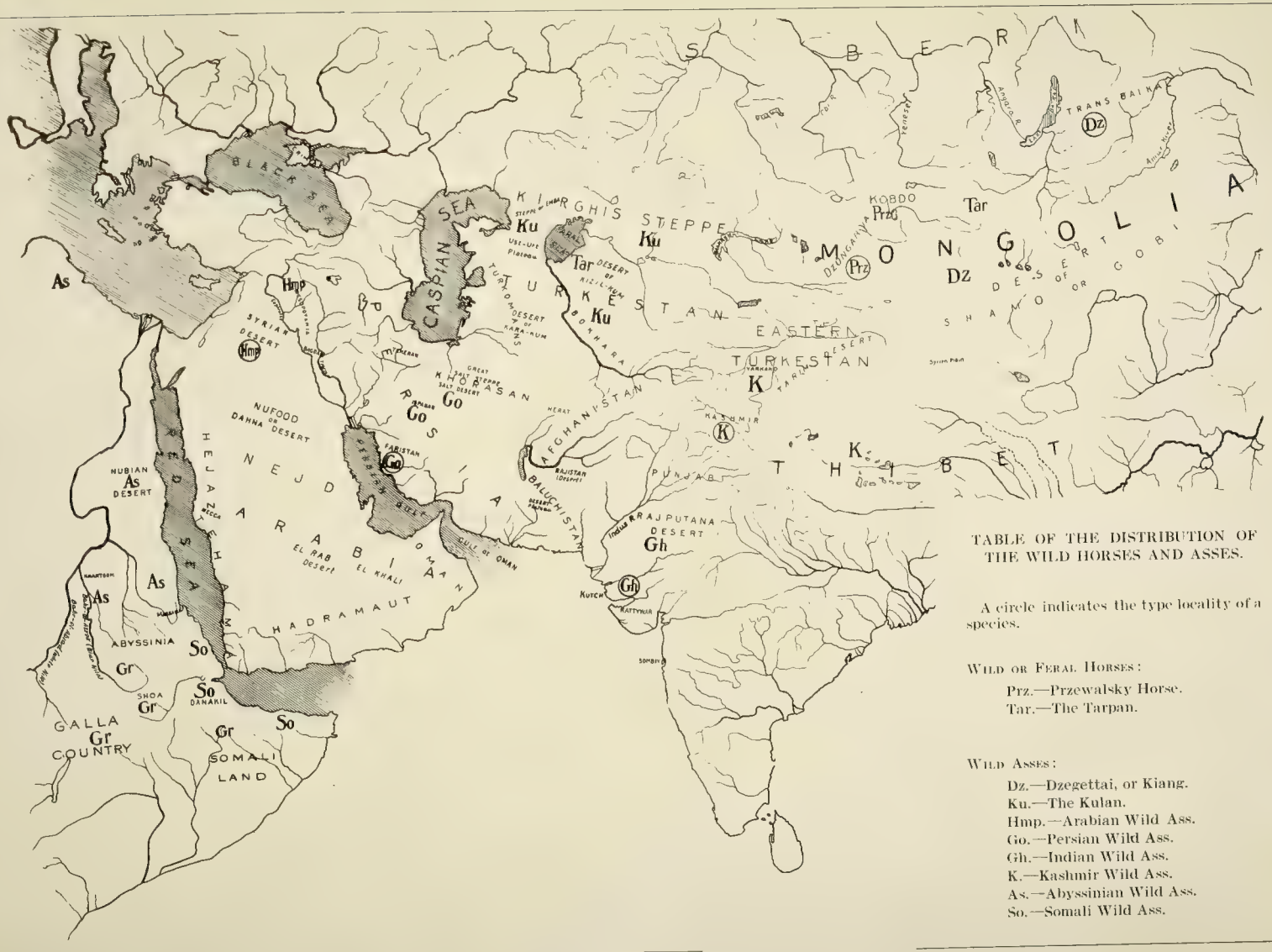



TABLE OF THE DISTRIBUTION OF THE WILD HORSES AND ASSES.

A circle indicates the type locality of a species.

WILD OR FERAL HORSES:

Prz.—Przewalsky Horse.
Tar.—The Tarpan.

WILD ASSES:

Dz.—Dzegettai, or Kiang.
Ku.—The Kulan.
Hmp.—Arabian Wild Ass.
Go.—Persian Wild Ass.
Gh.—Indian Wild Ass.
K.—Kashmir Wild Ass.
As.—Abyssinian Wild Ass.
So.—Somali Wild Ass.

THE WILD HORSES AND ASSES


ZEBRAS:

Gr.—Grevy's Zebra.
Fo.—Foa's Zebra.

B.—Burchell's Zebra.
Gt.—Grant's Zebra.
Crw.—Crawshay's Zebra.
Sel.—Selous' Zebra.
Zm.—Zambesi Zebra.
Ch.—Chapman's Zebra.
B.—Bohm's Zebra.
W.—Ward's Zebra.
Q.—The Quagga.

Z.—Mountain Zebra.
H.—Hoffman's Zebra.

DISTRIBUTION OF THE SURVIVING WILD HORSES, ASSES, AND ZEBRAS OF THE WORLD.

WILD HORSES
- *Equus przewalskii*, Central Asia.
- The Tarpan, formerly considered a hybrid, but recently described as a distinct species, northern Mongolia.

WILD ASSES
- The Kiang or Dzeggetai, *Equus hemionus*, east and south of Lake Baikal.
- The Kulan, *Equus* , east of the Caspian Sea, the Kirghez Steppes, and Turkestan.
- The Onager, *Equus onaga*, northwestern India and Persia.
- The Hemippus, *Equus hemippus*, northern Arabia and northwestern Persia.
- The Gour or Ghour, *Equus* , Rajpootana Desert.
- The Abyssinian ass, *Equus asinus*, Abyssinia and the Nubian Desert.
- The Somali ass, *Equus taeniopus*, *E. somalicus*, eastern Somaliland.

ZEBRAS
- The Grevy zebra, *Equus grevyi*, southern Abyssinia. The Galla country and northern Somaliland.
- Foa's zebra, *Equus foai*, near the Zambezi.
- Grant's zebra, *Equus granti*, Masailand.
- Chapman's zebra, *Equus chapmani*, Matabeleland.
- Burchell's zebra, *Equus burchelli*, Betuana
- The Quagga, *Equus quagga*, Cape of Good Hope.
- The Mountain zebra, *Equus zebra*, Cape of Good Hope,
- *Equus hoffmani* or *Equus penricei*, West Africa.

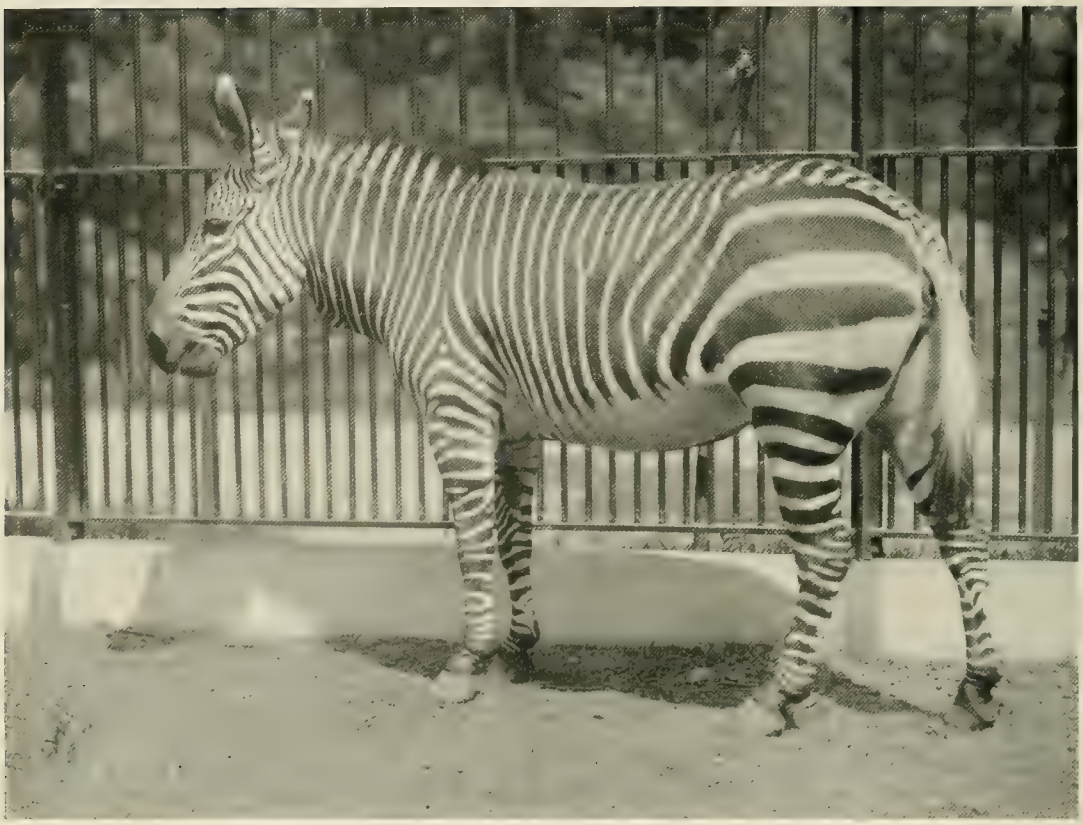


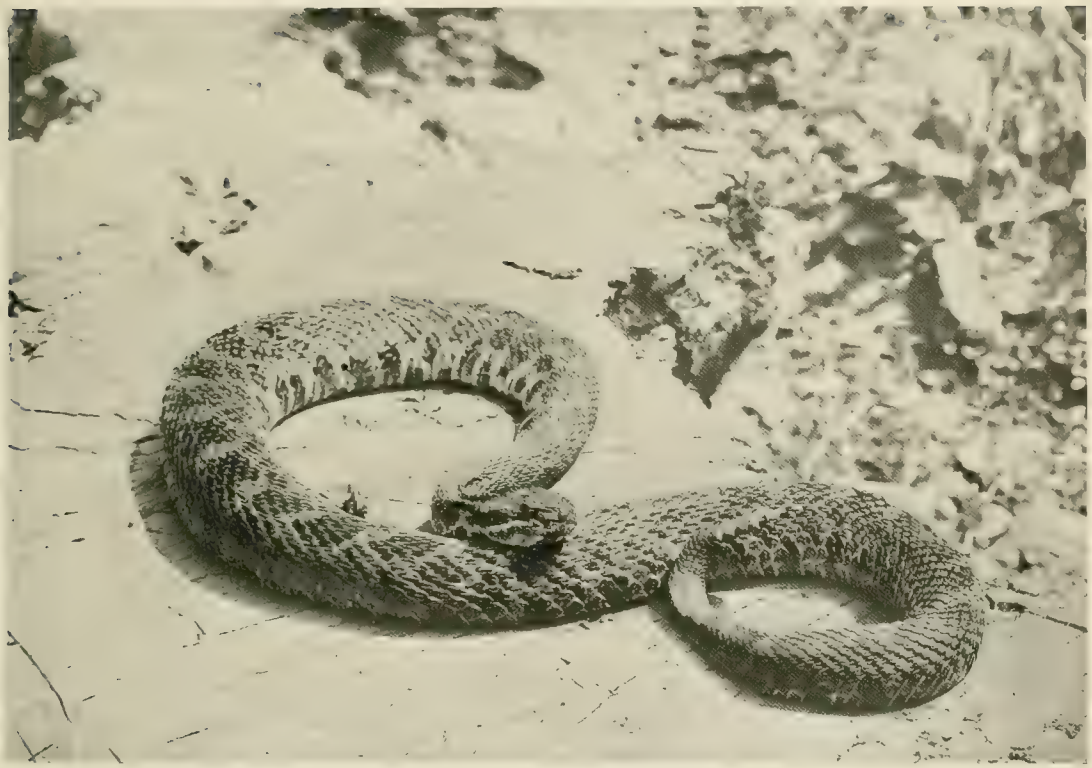
FIG. 11. THE EXTREMELY RARE MOUNTAIN ZEBRA. *Equus zebra.*

the North to striping confined to the shoulders and anterior portion of the trunk in the Quagga of the South. This fading out of the stripes, which affords a color transition between these brilliantly marked animals and the apparently monotonous color of the Przewalsky horse, affords strong ground for believing that all the horses were originally striped. This belief is strengthened by the fact that reversional striping occurs in all the dun colored horses on the face, the limbs, and the shoulders, while the medium back stripe is found in the duns, bays and browns among the horses.

The *Mountain Zebra* (Fig. 11) is the rarest animal in our entire collection, because it is now extinct throughout a large part of its former range and is carefully protected by the South African government in its remaining mountain fastnesses. Like the Grant zebra, its color bands are very broad and comparatively few in number, but it possesses a broad gridiron of transverse stripes over the hips, which is only partially developed in the Grant. Other characteristic features are its short head, very long ears, the distinct lap or loose fold in the under skin of the neck, and the very short, heavily-built limbs which adapt it to its mountain habitat.

The call of the Mountain Zebra is between that of the horse and the ass, and usually consists of three short, barking whinnies in quick succession. The note is uttered with great gusto, and the position assumed during the call is more like that of a horse than of the ass, which while braying stands quietly with the head up and the ears pricked forward. The disposition of the Mountain Zebra is generally vicious, whereas the Grant zebra is much more docile and capable of domestication.

It is interesting to note that although the zebras were well known to the Romans, this true or Mountain Zebra was the first of this group to be described by Linnaeus, as *Equus zebra,* from the figure in Edward's "Gleanings of Natural History." The Grevy zebra on the other hand, occupying the heart of Abyssinia, was the last of this great group to be discovered, not having been made known to science until 1882, when a specimen was presented to President Grevy of the French Republic, in whose honor the new species was named.



THE MASSASAUGA, OR DWARF RATTLESNAKE

# THE MASSASAUGA IN NEW YORK STATE

*By* Edward T. Whiffen.

THE Massasauga, a species of Dwarf Rattlesnake, is still to be found in New York State, in and around Cicero Swamp, which, with some interruptions, stretches across the northern parts of Onondaga and Madison Counties, between Oneida and Onondaga Lakes.

The main swamp is said to be fourteen miles long, and seven miles wide in its greatest extent. It consists of the swamp proper, in which are numerous "islands," or higher areas of land. Next to the dry land is the "shore," a wet, marshy strip, from seventy-five to one hundred yards wide. Beyond the "shore" is the swampy land proper, fairly dry in summer and covered by a dense growth of trees, bushes, ferns and moss. In some places this moss is knee-deep. Many of the bushes are of the huckleberry variety, and it is among these that the Massasagua is frequently seen in August and September, when berry-pickers go out into the swamp.

The Massasauga seems to like the neighborhood of swamps, though it shuns the actually wet places. In the harvest season it is usually found either in the hay-fields, or oat-lots, or it may be seen out on the moss among the bushes, or under the evergreen trees. However, it may occur almost anywhere. A gentleman told me that two years ago he found a large Massasauga in his wood-pile, about six feet from the house. Others reported having found the snakes in their cellars, or under the steps. There is an abundance of frogs and mice in the meadows, and frogs and birds in the swamp; and such conditions account for the presence of the reptiles in those places. In the hay-field the Massasaugas seem to select the damper spots, where the growth of vegetation is heaviest. There they are frequently cut in two by the knives of the mowing-machines. Newly-cleared fields, where there are plenty of stumps and berry-bushes, are also favorite lurking-places of this reptile, which is sometimes seen sunning itself on a stump, or lying coiled among the bushes.

In habit the Massasauga is shy and retiring, almost never lying out in the open. Its comparatively small size, somber coloration, and general sluggishness render it inconspicuous.

During the latter part of July and the early part of August, 1912, I succeeded in finding the three specimens which now are in the Reptile House of the Zoological Park. It must not be imagined, however, that search could be made every day. On the contrary, the season was so cold and rainy that there was scarcely one week of good hunting weather. The first specimen was discovered coiled up under a poison-ivy vine, at the end of a sluice, in a public road. In appearance it resembled a huge, peculiarly-colored toad, and made no movement when nearly stepped on. Not seeing what it was, half-petulantly I kicked the creature, when it fell down into the vine and then into a small puddle of water. It sounded its rattle, but even while being noosed and caught it did not strike.

For one day only could a guide be secured, so that I could get out into the swamp proper. Two Massasaugas were discovered, after an hour's hunt, coiled up within a few feet of each other, among some bushes. The first one seen (the larger of the three), fought viciously; but it was soon pinned down with a forked stick, its neck was seized, and it was then easily secured. The other was so sluggish that I put my foot on its coils, and seized it by the neck. During the entire process of its capture the snake did not strike, or even rattle.

Few bites and no deaths from this snake were reported by the farmers in the vicinity; but many farmers keep as an antidote a bottle of whiskey, which in some cases requires replenishing with suspicious frequency.

Older residents assured me that the snake is much less common than formerly, when its range extended over the entire northern part of the county. Its disappearance is due probably to ceaseless slaughter, and to the draining of the swamps. That it still is fairly common may be judged from the fact that the killing of a dozen snakes in an area of perhaps a hundred acres was reported within the space of two weeks' time. One of these snakes had sixteen rattles, and two had ten. Six or eight was a common number. The whole region is abundantly supplied with reptile life, milk snakes, ribbon snakes, garter snakes, water snakes, etc., being of frequent occurrence. As much of the swamp has little value for tillage purposes, and as the timber is small and comparatively worthless, the Massasauga, though in diminishing numbers, will probably continue to be found in this region for some time.

MOUNTAIN SHEEP RAM IN AUGUST
Photo. by C. Rungius

## SEASONAL CHANGES IN THE FORM OF THE ROCKY MOUNTAIN SHEEP.

*By* Carl Rungius.

EVERY artist who undertakes to paint big game must consider the seasonal changes that may or may not take place in the form of his model.

In color and pelage the animal must conform with the season of the landscape he chooses, otherwise ridiculous errors may arise. For example, a summer moose or a spring calf may be placed in a fall or winter landscape; or we may see an elk with growing antlers among falling leaves.

THE SAME RAM IN OCTOBER
Photo. by C. Rungius

THE MOUNTAINEERS: ON WILCOX PASS, ALBERTA

Painted by CARL RUNGIUS for EMERSON MCMILLIN, and by him presented to the NEW YORK ZOOLOGICAL SOCIETY. This is the artist's choice of a representative period for this species, (September). Copyright, 1912, by C. Rungius.

Whenever the artist intends to standardize a certain species, he must choose for the landscape that season of the year which will bring out the characteristic points of his subject. The pelage must be neither too long nor too short; and the animal must be in good condition. In every respect the finished work must represent a typical animal, well fitted to represent its species.

With some of our big game species the growth of the winter hair produces changes so great that their external form seems to change completely, and go out of drawing. In choosing a model and a season, these changes in form must be carefully considered. Having recently been enabled to study to good advantage the seasonal changes in the form of the Rocky Mountain Sheep, or Big-Horn, I have been asked to make this record of my observations.

For three seasons now, I have had the good fortune to study the mountain sheep in the Canadian National Park in Banff, Alberta. These sheep, two splendid rams, were caught when respectively four and five years old, during the winter, in the mountains near Banff, and were placed in an enclosure taking in a part of Cascade Mountain. There, under almost natural conditions, they have retained the form and "springiness" of wild game, and nearly its shyness, also.

Making studies or taking photographs of these animals could be accomplished only with the help of skilled hunters, to drive the rams slowly toward my place of concealment. Attempts to get results single-handed resulted only in occasional distant glimpses.

The first chance I had to see the rams was early in August. The period of shedding was past, and they wore a short, glossy coat, which brought out every muscle. Except for the mas-

sive horns and the large rump-patches, they then looked more like deer, with necks fairly long, legs long and graceful, and rather light bodies.

When I saw them again, late in October, upon returning from a hunt for sheep in northwestern Alberta, I was greatly surprised at their changed appearance. The whole anatomy seemed altered. The bodies had gained depth at the expense of the necks and legs, and were much broader, especially at the shoulders. The necks appeared almost disproportionately short and thick, and looked as if they were placed lower on the bodies, the back of the heads nearly touching the tops of the shoulders; while in front, the curve of the neck reached down to the brisket. And this, together with the heavier coated legs, made the sheep appear much smaller than when in the summer coat. The effect was produced solely by the growth of hair, as the rutting season was still some time away.

I have not seen mountain sheep in the winter, but to judge from this change of appearance within two months, I do not think sheep would make very imposing models during the winter months; while the early summer coat, which, to be sure brings out the anatomy well, is not favorable either, as it lacks character. September is the month when the ram is at his best. Then he certainly is an inspiring subject for the animal sculptor and painter. I might add here that all our hoofed game looks its best during September and early in October, though this is not the idea of many taxidermists, who think a long-haired, winter scalp produces the finest effect. But such a growth obscures the lines, so that only a very skilled man can make the mount appear life-like.

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*Experiments with Serpents.*—We are preparing a room at the Reptile House where experiments may be conducted with serpents in a hibernating condition. It is the intention to keep this room at a temperature of about 40 degrees Fahrenheit. The Curator of the Reptile Department has for some time been convinced that the short life in captivity of many snakes of the temperate latitudes is due to the secretion of excess fats while the reptile feeds through a period when it should be dormant, and slowly assimilating these fats. Certain it is that we create an abnormal condition by keeping our reptiles from northern or southern latitudes in a uniform heat during the entire year. Many of the snakes involved live in captivity not more than a year. Post-mortem examinations usually trace the trouble to the stomach and intestines. We intend to keep our test specimens cold, dormant and fasting until the spring, and subject them to the same conditions for the following winter.

FLYING LEMUR CLIMBING

## THE FLYING LEMUR.

*By* C. William Beebe.

Borneo is a land of flying creatures, and besides birds, bats and insects, one may see squirrels, lizards, frogs and even snakes occasionally trusting themselves to the thin air, buoying themselves, or at least breaking their fall, with parachutes or membranes of fur, skin or scales. One of the most interesting and beautiful is a large furry creature, somewhat squirrel-like in general appearance, which has unfortunately no correct common name. It is usually known as the Flying Lemur, but this is no more applicable than the literal translation of its scientific name *Galeopithecus volans*—the Flying Weasel-monkey, for it is neither one nor the other of these animals, but rather a distant cousin of moles and shrews. But here again it presents the anomaly of being classed with the insectivores while in diet it is a vegetarian. The best known name of Lemur will serve our purpose.

If we happen to be in some open glade or old trail in the Bornean jungle at about five in the afternoon and wait until dusk closes down, we may see a large dark mass detach itself from high up on a trunk of a tree and pass with a rush close to our face in a smooth gliding flight to another tree, perhaps forty yards or more away. From the general appearance and noiseless flight I thought, when I first watched one of these nocturnal creatures, that it was some large owl making a low swoop through the glade. But finally I marked the spot where it alighted and creeping up I saw

FLYING LEMUR PROGRESSING ON THE GROUND

a large, irregularly draped figure, topped with a fox-like head, creeping slowly up the trunk. When later I examined some of these animals closely I found that the Flying Lemurs, for such they were, had many interesting traits and characters. Like certain owls they exhibit two distinct color phases—a rufous and a grey, independent of age or sex. The rufous phase is much rarer, as far as my experience goes, only about one in a dozen individuals being of this warmer hue.

The first adult female which I secured was of a beautiful pale grey with irregular lichen-like mottlings and linings, forming an indefinite marbled pattern which made it almost invisible by daylight against the trunk of a jungle tree.

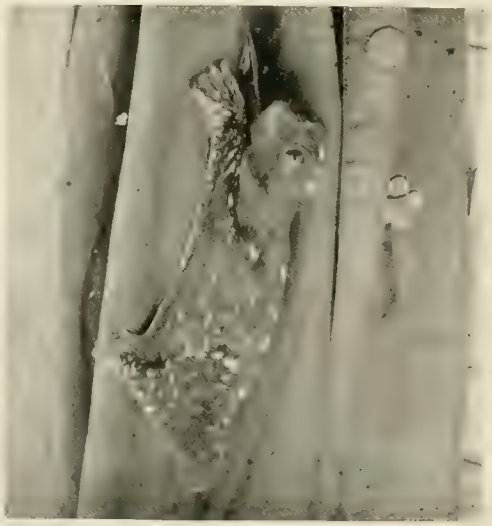
The great hazel eyes are over half an inch across; the keen little fox-like muzzle is always sniffing for scent of danger, and the wonderful soft flight membrane stretched even beyond the tips of the fingers and toes. When the flight is watched carefully, as silhouetted against the clear evening sky, there seems to be a very decided flapping, sometimes almost like the slow flaps of the great flying-fox bats. But repeated careful observation revealed that at each flap or convulsive movement in mid-air the direction was slightly changed, and I am certain that the movement was rather for balancing or steering, than an effort to increase the speed. I do not believe the latter feat is possible. At the end of the flight there is very often, although not invariably, a decided upward swoop to the point of alighting.

In Kashmir I found the koklass pheasants associated with the giant flying squirrels, and here the crestless firebacks lived in the same woods with the Flying Lemurs.

Toward the end of our stay at one of Rajah Brooke's bungalows, a tree was felled not far away, and from among the branches near the top (not in a cavity) there rolled a young Flying Lemur. Although it was of fair size and had a full set of teeth it was wholly incapable of flight. When placed on the grass in the sunshine, it lifts itself up and looks about, then proceeds by hops, or more exactly flops, toward the nearest bush or tree. After each flop, it comes down in a peculiar spread-eagle position. The helplessness of this specialized animal when upon a flat surface is almost equal to that of a bat. Its terrestial movements recall vividly the mode of progression of a seal. When it reaches the stem of a plant it climbs at once, one hand over the other, not by gripping the stem, even if this is a very thin one, but by sheer catching power of the claws. When it reaches the shade of a bunch of leaves it puts the two fore feet together, and the two hind feet, and crouches close to the stem or trunk.

In the sunshine its pupils contract to very small openings, and the light is evidently painful, as it turns aside its head and does its best to get into the shade. It will not stay head downward for a moment, but does not object to a sloth-like pose. The vertical clinging is the one that suits it best, however.

When smoothed or teased, or disturbed in any way it utters a rasping, complaining cry, very like the voice of a disturbed flying fox under similar conditions, somewhat like a small saw



YOUNG FLYING LEMUR

rasping through wood. This rises to an infantile squawl when extremely irritated. It shows no fear, but does not like being handled or touched. When threatened it will strike out, cat-like, with one paw, but never tries to bite.

It took a few drops of cocoanut milk, and chewed up the petal of a temple flower; but at night it refused banana, a grasshopper, tender bamboo and fern shoots and milk. Its constant desire is to climb upward. It sleeps in the regulation clinging position for several hours in the afternoon, clinging to an oil-skin raincoat, but at dusk it becomes active and noisy.

When put in a dark corner in a bird cage on the verandah of the bungalow, the little creature settles down quietly, but after half an hour utters from time to time a low but penetrating call, hardly different from some of the insect voices which fill the air.

In the early mornings I found the little creature in its sleeping posture, clinging with all four feet to the roof of its cage; the feet close together and the tail and head curled inward, until the back formed almost a circle.

It ate half a banana and licked some milk from a finger-tip, but did not seem to relish anything. After a few days it became weak and I chloroformed it. Its measurements were about half those of the adult female, and it weighed a pound.

In color the little lemur is very different from the adult which I have described, being in the rare rufous phase much like a young deer; a rich rufous ground with numerous spots of white.

The Flying Lemur does not seem to thrive in captivity, and I do not know of any which have been successfully brought to Europe or America. There are several species, which range from Siam southward through the Malay Peninsula to Sumatra, Java, Borneo and the Philippines.

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*Pygmy Hippopotami.*—To the list of existing specimens of the Pygmy Hippopotami, (*H. liberienses*), now existing in American zoological parks and museums, there must be added a fine and perfect adult skin and skeleton, from the Mauwa River, Liberia, on exhibition in the Museum of Comparative Zoology, Cambridge, Mass. Both specimens were mounted by Rowland Ward, of London, and have been on exhibition in the M. C. Z. for about three years.

The three living specimens in the Zoological Park continue to thrive. Their appetites may fairly be described as robust, and the quantity of mixed vegetable food that they consume promises long life and good condition. The two immature specimens take kindly to their attendants, but the adult male exhibits an irascible and almost vicious temper.

## LUMPY-JAW IN BIG-HORN SHEEP.

The news that lumpy-jaw exists among the big-horn sheep (*Ovis canadensis*) of the Bitter Root Mountains, Idaho, causes us grave concern. It is the first time, so far as we are aware, that our home species of mountain sheep has been so attacked. In 1907 we discovered the presence of lumpy-jaw in specimens of the black mountain sheep from the Sheslay Mountains, Northern British Columbia, where, so we have recently learned, it still exists. Four times have prong-horned antelopes from our Rocky Mountain states brought that dread scourge into the Zoological Park, with fatal effect to the antelopes.

Lumpy-jaw, or actinomycosis, in wild animals appears to be incurable. In the antelope the disease is generally fatal within about two weeks after it reaches the critical stage. It is fully described and illustrated in a paper by Dr. W. Reid Blair, our veterinary surgeon, in the Eleventh Annual Report of the New York Zoological Society, page 137. It is greatly to be feared that lumpy-jaw is now so prevalent among the bands of prong-horned antelope that now constitute our remnant of that species, that it will do much toward hastening the total extinction of the prong-horn that now seems to be impending.

We hope that some of our remnant bands of mountain sheep will be saved by their isolation from the Bitter Root outbreak, but there is no reason to believe that any sheep in touch with the Bitter Root mountains can escape destruction by the incurable scourge.

W. T. H.

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## CARL HAGENBECK.

The king of wild animal collectors is very ill.

Carl Hagenbeck is in shattered health. For several long and weary months he has been confined to his wheeled chair, and his chief solace has been the contemplation of the unique and popular "zoological paradise" that his genius has created at Stellingen, just outside the boundary of Hamburg.

Mr. Hagenbeck has enjoyed a wonderfully interesting and picturesque career. The completion of his Stellingen wonderland, and the publication of his autobiography, "Beasts and Men," in 1910, fairly rounded out his life work; and his success was finally crowned by two visits from Emperor William of Germany. His latest achievement was the construction of a small zoological garden at Rome, designed on the principles that have been wrought out so successfully at Stellingen.

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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Each author is responsible for the scientific accuracy and the proof reading of his contribution.
Elwin R. Sanborn, Editor.

Vol. XVI. No. 55. JANUARY, 1913

Mr. Archer M. Huntington has been elected a member of the Board of Managers, class of 1915, to fill the vacancy caused by the death of Mr. Hugh J. Chisholm.

On November 28th, 1912, Governor Dix reappointed Mr. Madison Grant, a Bronx Parkway Commissioner, for a term to expire July 25th, 1917.

## ANNUAL MEETING.

The Annual Meeting of the Society will be held in the Grand Ball Room of the Hotel Waldorf-Astoria, Fifth Avenue and Thirty-fourth Street, New York City, on Tuesday, January 14th,, 1913, at 8:30 o'clock, P. M. Mr. John L. Cadwalader, Vice-President of the Society, will preside, and Mr. Madison Grant, Chairman of the Executive Committee, will lay before the meeting the report of that Committee for the year 1912. Twelve managers will also be elected to succeed the outgoing class.

The reports of the Executive Committee, of the Treasurer, and of the Directors of the Zoological Park and the Aquarium will be printed in full in the Annual Report of the Society, which will be forwarded to members during the early part of 1913.

Immediately after the business meeting the following addresses will be presented:

"The Paleolithic Hunter and His Own Pictures of His Game," by Madison Grant. An address illustrated from the mural decorations recently discovered in the French and Spanish caves.

"Saving the Elk," by S. N. Leek, with moving pictures, showing the great wapiti herds of Wyoming, and the efforts made to preserve them from starvation.

Refreshments will be served, and each member is entitled to bring one guest, including ladies.

## OUR AFRICAN EXPEDITION.

Undaunted by the fact that our first gorilla lived only ten days after arrival in the Park, the Zoological Society decided to send to West Africa another expedition for the capture of live gorillas. The untimely death of the first gorilla was due to a combination of circumstances beyond our control, and there is good reason for the belief that another effort, made with a liberal margin of time for the working out of details, will be completely successful. If gorillas can be landed here, having even a fighting chance for survival, we believe that we can be just as successful with them as we have been with orangs and chimpanzees.

Mr. R. L. Garner is now on his way back to West Africa, in quest of gorillas for the Park, and it is our expectation that he will eventually return to us with some good, healthy specimens that will "live long and prosper."

## A GREAT PAINTING.

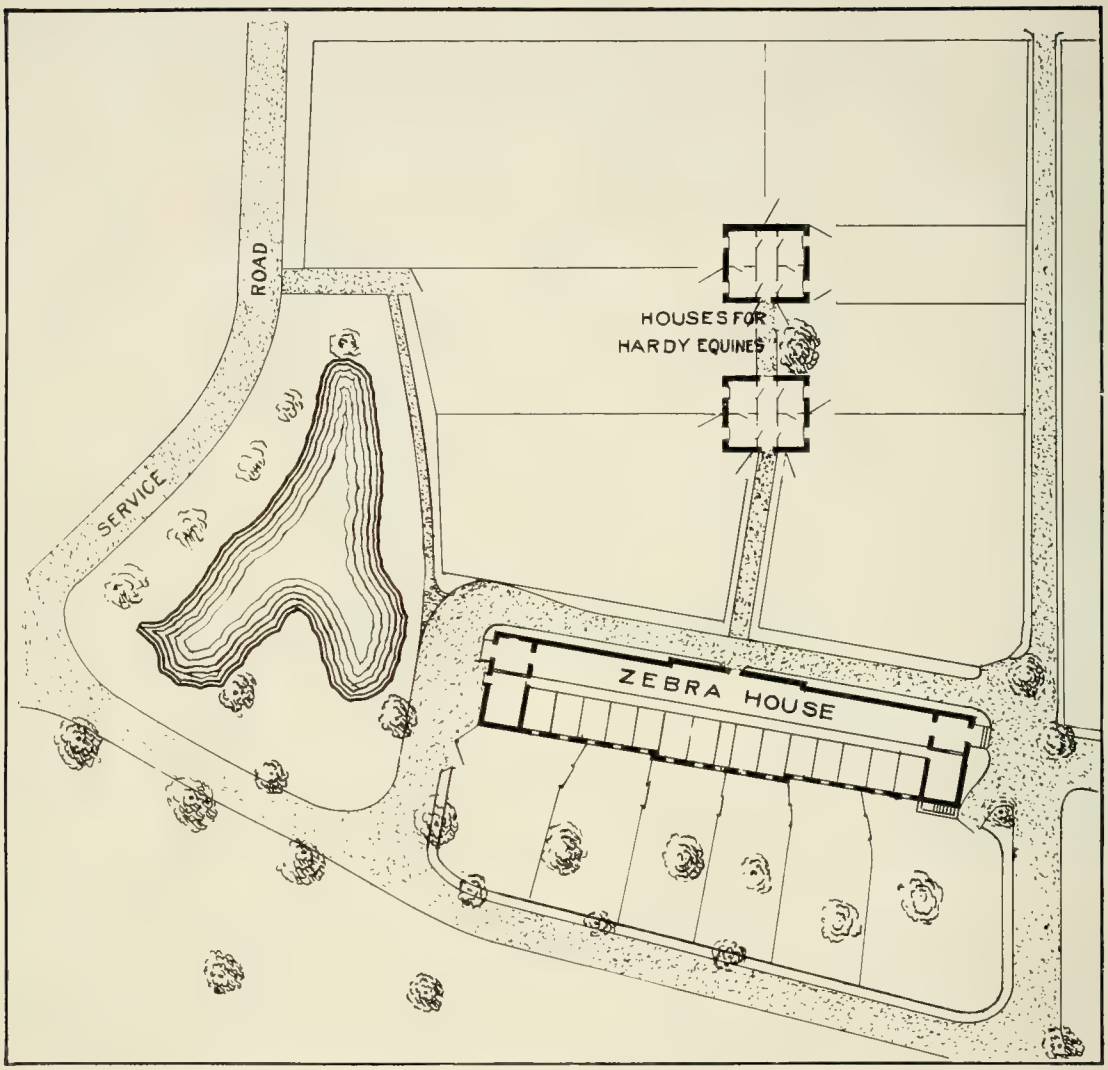
In view of the rapidity and thoroughness with which some of our game animals are being exterminated, it is high time for them to be preserved on canvas, in bronze and in museums. It is probable that ere long the prong-horned antelope will remain to us only in those forms.

The masterpiece of wild-animal painting which is reproduced on page 951, is a worthy memorial of the fine species it depicts. It is Mr. Rungius's largest and finest production (60 by 75 inches), and as a gift it is almost as noteworthy as the Reed-McMillin collection of Alaskan heads and horns.

This is the third Rungius painting of American big game that the Society has acquired through the generosity of Mr. Emerson McMillin; and to the best of our knowledge and belief it is the finest wild-animal painting in America. Temporarily it hangs in the East Gallery of the Heads and Horns Collection.

In connection with this subject there is to be noted a strange and unaccountable state of fact. The public art galleries of America contain good representations of every branch—and even every twig—of pictorial art, except pictures of wild animals. So far as we can recall, or learn by inquiry, there is not one public art gallery in all America that contains even one noteworthy painting of an American wild animal. The wild animals of the world offer to painters a magnificent field that as yet has barely been touched by the brush.

W. T. H.




NEW ZEBRA AND WILD HORSE HOUSES, AND THEIR ENVIRONS

## ZOOLOGICAL PARK NOTES.

*New Rodents.*—Our collection of western rodents has materially strengthened the small mammals grouped in the economic rodent-reptile series. These consist of gopher rats, pack rats and several of the smaller species of rats and mice that injure the products of the great grain belts. While it has been alleged that the average life of small mammals is comparatively short, this being particularly the case with the rodents, we have already made some interesting notes relating to the longevity of species of North American gnawing animals. The jumping rat (*Dipodomys*) lived in this collection for a period of three years.

*Sagacity of Monkeys.*—It amuses our visitors to watch the monkeys operate the swinging doors that lead to their outside cages. These doors are hinged from above, and swing both ways. The object is to enable the hardy monkeys to run out of doors at will, and at the same time prevent drafts from entering the cages. Some of the monkeys appear to take a vindictive delight in enticing a cage-mate to one of the doors, holding it open for an instant, then suddenly darting through and allowing the door to come down with a bang upon the head of the follower. It is quite surprising to observe how readily the new arrivals learn to operate these doors. Usually this is accomplished within a half hour after specimens have been installed. The common macaque, the rhesus monkey, the mangabeys and black apes run out in the coldest weather, and appear to enjoy a wild romp in a temperature well below freezing. After a half hour's play they will enter the building, and after becoming well warmed, are ready to sally forth again for another limited period.

*Signs of Winter.*—Already we have experienced temperatures well below 20 degrees Fahrenheit; and

all the delicate animals have been housed for the winter. During one of the coldest days an Axis Deer was born, and there was great danger that it would die from exposure. At first the mother quartered the little animal on a bed of hay close to the shelter house, but at night she guided it into the warmest corner of an inside stall. This little animal survived and is now doing well. It is with provoking frequence that tropical deer are born in cold weather, and often it is difficult to carry out measures adequate for the protection of the young. Usually the mothers are extremely wild, and must be handled with the greatest caution. During the cold months the females of tropical deer often exhibit a tendency to attack the males, biting them and beating them with their feet, and causing the keepers great trouble in arranging the separations that alone put an end to these family quarrels.

*The Yak Shelter.*—Construction work shortly will begin on the Yak Shelter, which will consist of a low building of rustic stone, in keeping with the wild country inhabited by this strange and spectacular creature of Tibet. The walls of this shelter will be constructed of the great blocks of stone that are being blasted out of the ledges behind the old administration building, where the work shops and supply buildings are being erected. Powerful derricks are assorting and piling up this material, and it will soon be moved to the site of the Yak Shelter, which is in the Fallow Deer range, near the southeastern entrance of the Park.

*Restaurant Improvements.*—With the new year the Rocking Stone Restaurant offers more commodious accommodations to its patrons. The inside dining room and the southern pavilion have been increased to twice their original size. In the former, the lighting arrangements have been much improved, and a series of large windows look out upon the virgin forest of Beaver Valley. The location is particularly pleasing. The southern windows face the bison range. The interior finish is in white and pale green, and the floors of the entire restaurant have been renovated in order to be in keeping with the general improvements. In summer large awnings will shade the dining pavilion outside.

*A Hint of the Tropics.*—The interior of the reptile house at night is in marked variance with the bleak conditions out of doors. In some way, several species of tropical singing insects have appeared in the building, probably brought in with the plants. The stridulations of these creatures are remarkably sweet, sounding like small bells of different tones. The singing of these insects, and the heavy, humid air exhaled from the conservatory plants, impart a real touch of the tropics. We are sorry to say that this aspect has been strengthened by the appearance of a huge, roach-like insect that appears to do no particular damage, but is not particularly pleasing to any one save the frogs and the nocturnal lizards which are voraciously fond of these pests. We are rapidly exterminating them by ingenious traps constructed by the keepers.

*African Beetles.*—After several months in transit, a small tin box arrived from Africa containing specimens for our insect collection. We dubiously inspected the contents, as the package came on a very cold day, but it was found to contain five perfectly healthy though much benumbed giant weevils. These strange creatures, each about two inches long, are of a dull brown color, with bronze stripes. Their limbs are swollen at the joints, making the segments appear as if they were crudely soldered together. The appearance of these clumsily-crawling, mammoth insects immediately suggests a batch of mechanical toys, like some of the creations that amble about the feet of the sidewalk vender. Our collector sent instructions about the feeding of the specimens, and although we were in doubt about the possibility of obtaining the proper food, this was soon secured through the courtesy of the New York Botanical Gardens. Bulbs of the genus *Crinum* appear to be the favorite food of our new arrivals.

*Two Litters of the Fer-de-Lance.*—Mr. R. R. Mole, of Port-of-Spain, Trinidad, who has sent us many interesting specimens from that island, recently shipped two very fine examples of the deadly Lance-Headed Snake, known among the Creole-French as the Fer-de-Lance. On the 15th of November one of these snakes gave birth to fifty-seven young. A week later the other specimen gave birth to twenty-eight vigorous little serpents. They were born fully provided with venom-conducting fangs, and are always ready to use them. They are particularly interesting in the coloration of the tail, which is of a vivid sulphur yellow. It has been alleged that the little lance-head uses the brightly colored tail as a bait for small frogs, wriggling the appendage in a way that makes it appear like a grub or maggot.

*Ferocity of the King Cobra.*—The most dangerous specimen in the Reptile House, possibly the most dangerous of our captives in the Zoological Park, is the big King Cobra, which has been with us about nine years, and has increased in length from eight feet to slightly over eleven. The species which this snake represents is noted for its intelligence. The Curator of Reptiles believes that this is the most sagacious member of any of the orders of the reptilia. This snake has been known to actually attack its keepers. It is with great difficulty that its cage is safely inspected and cleaned. A special device was designed for cleaning the glass of this cage. Strangely enough, we have found there are two things that curb the fighting spirit of this snake: It is afraid of a small shovel or a broom. With these implements at hand the keepers find it possible to drive the fighting snake into a corner of its cage, and clean the glass by means of a long tube attached to the nozzle of the hose, the tube having a sponge attached to it. We have many visitors who regularly come to the reptile house on Sunday morning to see this cannibalistic serpent devour its weekly meal. For a day or so prior to the feeding time the cobra may often be seen reared up at the door of its cage, intently watching the keepers through a small panel of wire netting.

INTERIOR OF THE NEW ZEBRA HOUSE

## THE NEW ZEBRA HOUSE.

Without formality the new Zebra House was thrown open to the public late in November. Our collection of wild equines is at last exhibited in a series, and thus brought together they make a fine showing. The animals exhibited represent Grevy's Zebra, Grant's Zebra, Chapman's Zebra, the Mountain Zebra, Przewalsky's Wild Horse and the Persian Wild Ass. There are eleven examples in this collection. Just at this moment we lack the Kiang and Somali Wild Ass, but we expect to secure both those species very shortly.

The new building is of very satisfactory design. It is long and broad, and its roof is low enough to flood the stalls with light from generous skylights of ribbed glass. The total length of the structure is one hundred and eighty feet. The length of the exhibition hall is one hundred and forty-two feet. The width of the promenade in the exhibition hall is twelve feet. Twelve stalls, raised a foot from the floor, are fronted by panels of electric-weld wire. Eight of these stalls show a measurement of twelve by fifteen feet. The four central stalls are larger, being eleven by seventeen feet. All of the stalls open into long, broad yards, each of which contains a shade-tree. The fences and gates of all the corrals are from our own work shops, and are admirably adapted to their purpose. This building provides two stalls to the yard, thus rendering breeding arrangements especially good.

Two open-air barns immediately to the west of the Zebra House form an essential part of the wild equines' installation. With these buildings we shall continue the breeding of the Przewalsky Wild Horse and our experiments in the acclimatization of Zebras. R. L. D.

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*New Mountain Goats.*—We have recently received an addition to our colony of Rocky Mountain Goats. There are four new specimens, three of which are females. A male and a female specimen are about two years old. The two remaining specimens were born in 1912, and the antics of these vigorous youngsters are eccentric and amusing.

*Panoramic Backs for Cages.*—The work of painting panoramic backgrounds in the large cages of the Reptile House will be resumed with the beginning of severe winter weather. Mr. Costain, our scenic artist, will shortly begin work upon a Malayan river scene, in the big python's cage. The work to follow will embrace the portrayal of American and African deserts, and the veldts of South Africa. The latter cages will be occupied by cobras and lizards.

# GENERAL INFORMATION

## MEMBERSHIP IN THE ZOOLOGICAL SOCIETY.

Membership in the Zoological Society is open to all interested in the objects of the organization, who desire to contribute toward its support.

The cost of Annual Membership is $10 per year, which entitles the holder to admission to the Zoological Park on all pay days, when he may see the collections to the best advantage. Members are entitled to the Annual Reports, bi-monthly Bulletins, Zoologica, privileges of the Administration Building, all lectures and special exhibitions, and ten complimentary tickets to the Zoological Park for distribution.

Any Annual Member may become a Life Member by the payment of $200. A subscriber of $1,000 becomes a Patron; $2,500, an Associate Founder; $5,000, a Founder; $10,000, a Founder in Perpetuity, and $25,000, a Benefactor.

Applications for membership may be handed to the Chief Clerk, in the Zoological Park; Dr. C. H. Townsend, N. Y. Aquarium, Battery Park, New York City, or forwarded to the General Secretary, No. 11 Wall Street, New York City.

## ZOOLOGICAL PARK.

The Zoological Park is open every day in the year, free, except Monday and Thursday of each week, when admission is charged. Should either of these days fall on a holiday no admission fee is charged. From May 1 to November 1, the opening and closing hours are from 9 o'clock A. M. until one-half hour before sunset. From November 1 to May 1, the opening and closing hours are from 10 o'clock A. M. until one-half hour before sunset.

## NEW YORK AQUARIUM.

The Aquarium is open every day in the year: April 15 to October 15, from 9 o'clock A. M. to 5 o'clock P. M.; October 16 to April 14, from 10 o'clock A. M. to 4 o'clock P. M. No admission is charged.

## PUBLICATIONS.

The publications of the Society are for sale at the prices affixed below. Address H. R. Mitchell, Chief Clerk, New York Zoological Park.

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|---|---|---|
| First Annual Report | Paper | $ .40 |
| Second " " | Paper | $ .75 |
| | Cloth | 1.00 |
| Third " " | Paper | .40 |
| | Cloth | .60 |
| Fourth " " | Paper | .40 |
| | Cloth | .60 |
| Fifth " " | Paper | .75 |
| | Cloth | 1.00 |
| Sixth " " | Paper | .75 |
| | Cloth | 1.00 |
| Seventh " " | Paper | 1.00 |
| | Cloth | 1.25 |
| Eighth " " | Paper | 1.00 |
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| Ninth " " | Paper | 1.25 |
| | Cloth | 1.50 |
| Tenth " " | Paper | 1.25 |
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| Eleventh " " | Paper | 1.00 |
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| Fifteenth " " | Paper | 1.00 |
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| Sixteenth " " | Paper | 1.00 |
| | Cloth | 1.25 |
| Notes on Mountain Sheep of North America (Hornaday) | Paper | .40 |
| Destruction of Our Birds and Mammals (Hornaday) | " | .15 |
| The Caribou (Grant) | " | .40 |
| " " " | Cloth | .60 |
| The Origin and Relationship of the Large Mammals of North America (Grant) | Cloth | $ .75 |
| Zoologica Vol. I. Nos. 1-7 inc. (Beebe), | the Set | 1.30 |
| Zoologica Vol. I. No. 8. The Northern Elephant Seal (Townsend) | | .25 |
| Zologica Vol. I. No. 9. Diseases of Primates (Blair) | | .15 |
| Zoologica Vol. I No. 10. New Blood Pheasants (Beebe) | | .15 |
| Zoologica Vol. I. No. 11. Feeding Habits of Serpents (Ditmars) | | .50 |
| The Cultivation of Fishes in Ponds (Townsend) | | .20 |
| Chameleons of the Sea (Instantaneous Color Changes in Fishes) (Townsend) | | .15 |
| Sea-Shore Life (Mayer) | Cloth | 1.20 |
| Guide Book: New York Zoological Park (Hornaday) | | .25 |
| | By Mail | .35 |
| The National Collection of Heads and Horns (Hornaday). Large quarto. Parts 1 and 2 | Paper, Each | 1.00 |
| Bulletin Nos. 1 and 6 | Out of Print | |
| Bulletins—bi-monthly | Yearly by Mail | 1.00 |

Souvenir Books and Post Cards of the Zoological Park may be obtained by writing the Chief Clerk, New York Zoological Park, New York City.

Publications and Post Cards of the Aquarium may be obtained by writing Dr. C. H. Townsend, Director, Battery Park, New York City.


NEW YORK ZOOLOGICAL SOCIETY
FOUNDED 1895

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