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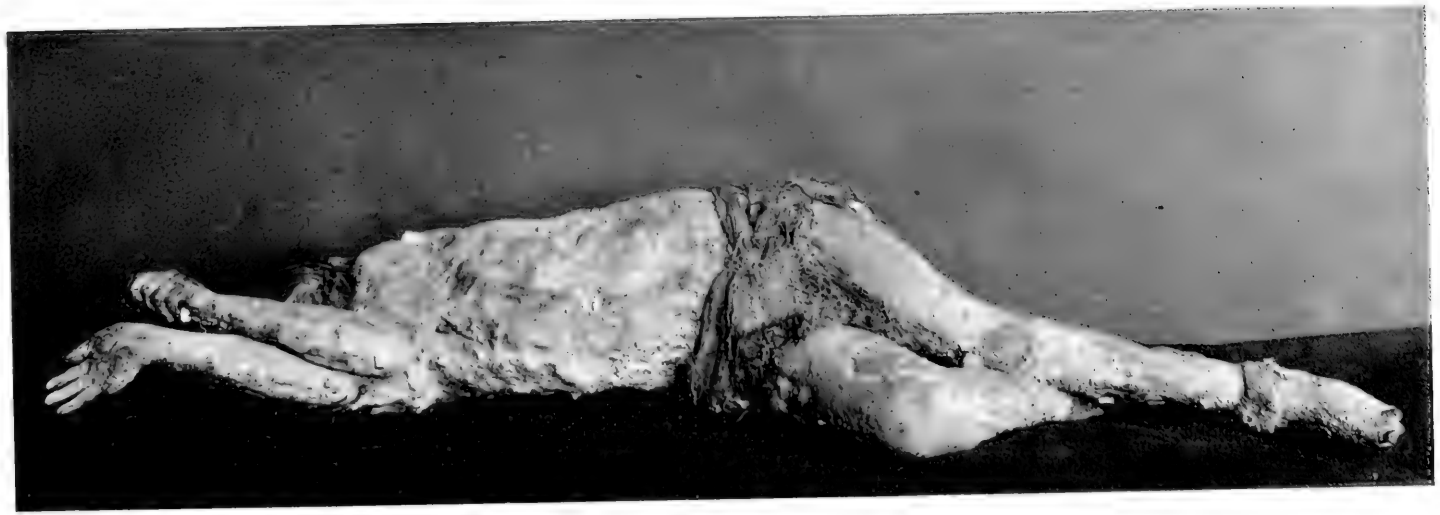


THE CHILEAN MUMMY

Naturally Mummified Body found in a copper mine at Chuquicamata, Chile.

The American Museum Journal

VOL. VI. JANUARY, 1906. No. 1

THE chief feature of the current number of the JOURNAL is an article by Dr. B. E. Dahlgren, of the scientific staff of the Museum, describing the development of a mollusk and forming a guide to the series of models which he has prepared to illustrate the development from the egg to the adult stage of the little shell known to the conchologist as *Crepidula*. This shell occurs in great numbers along the North Atlantic coast and is commonly known in the United States as the "Boat Shell," on account of its shape and the diaphragm in it which resembles the thwart of a boat. In Great Britain the same shell is called the "Slipper Limpet." This article is also published separately as No. 21 of the Museum series of Guide Leaflets and may be obtained at a nominal price.

A NATURALLY MUMMIFIED BODY FROM CHILE.

ONE of the most remarkable specimens that the Department of Ethnology has acquired in years was obtained by the Museum in November. It is a naturally mummified body which was found in a copper mine at Chuquicamata, province of Antofagasta, Chile. The condition of the body shows that the unfortunate miner, probably a woman, was caught by a cave-in of the roof and partly crushed. The mummification seems to have been produced in part by the action of copper salts and not to have been merely a desiccation due to the dryness of the region. The skin has not collapsed on the bones, as in the mummies found usually in the region, but the body and limbs preserve nearly their natural size and proportions, except for the crushing already mentioned. No analysis has yet been made of the tissues, so that it is too early to hazard any supposition as to

the chemical changes which have been undergone. The mine has been worked for an unknown length of time upon a peculiar deposit of atacamite, a hydrous chloride of copper, which is much prized on account of its easy reduction. The age of the mummy is unknown, but it is supposed to be pre-Columbian.

THE SERIES OF ETHNOLOGICAL BUSTS.

THE model of the bust, or rather the head and neck, of the young Filipino, illustrated on page 5, is one of an extensive series of typical portrait busts which the Museum has been assembling during the past eight years. The basis of the model is a mold, or mask, of the face taken from a living subject. The Museum now has more than five hundred such molds, together with the additional data necessary for producing the busts. A large number of complete busts has already been prepared. They are in use for study and for exhibition in the Museum and are in constant demand for exchange with other institutions.

The greater part of the molds represent typical individuals of the North American tribes: the Indians of the Eastern Woodlands, the Plains and Pueblo districts, California, the Pacific Coast and the Eskimo of the Arctic regions. Of Asiatic peoples the Aino, Chinese, Japanese and several Siberian tribes are well represented. Molds from the Philippine, African and South American native tribes who were at the St. Louis exposition are recent additions to the series.

It is the purpose of the Department of Ethnology to make a collection in which all the physical types of man shall be represented For many years the value of a collection of skulls from the different races has been appreciated, but the experience of investigators is that skulls alone give inadequate data for the study of a race, since differences in the form and size of the skull are not correlated with variations in the size and form of the head. The ideal method of studying the facial characteristics of a race is by means of direct measurement of living subjects. Since, however, such subjects are not always available, and an

CLAY BUST OF FILIPINO YOUTH

Modeled at the American Museum of Natural History by Caspar Mayer.

opportunity for repeating measurements is not often offered, properly prepared molds of faces provide the ethnologist with a reliable record upon which to base his investigations.

The task of making the molds from life and preparing the modeled busts for the Museum series was placed in the hands of Mr. Caspar Mayer, under the direction of the curators of the Department of Ethnology Mr. Mayer has greatly improved the old methods and has devised new processes for taking life-masks and utilizing them in connection with photographs and measurements for the rapid production of busts which represent with reasonable accuracy the individuals treated.

THE COLLECTIONS ILLUSTRATING THE ROCKS AND MINERALS OF MANHATTAN ISLAND.

THOSE who are interested in local geology and mineralogy will find much to repay careful study in two collections which are on exhibition in the Museum : the rocks of Manhattan Island at the north end of the Hall of Geology, and the loan collection of the New York Mineralogical Club, comprising an almost complete series of the minerals of the island, which is on exhibition in Case 27 in the Morgan Mineral Hall. In addition to the collections on exhibition, there is a large study collection of the rocks which were encountered in the excavation of the Subway.

The foundation of Manhattan Island consists entirely of crystalline rocks: gneiss, mica, schist, hornblende schist, serpentine and magnesian limestone (dolomite). Cutting through the gneiss and schist there are countless veins and dikes of granite and pegmatite, and these have supplied most of the minerals for which the island is noted. The crystalline rocks have been covered with a mantle of Glacial Drift (unstratified gravel, sand and clay) of varying thickness, while below Fourteenth Street there are extensive river deposits of stratified gravel, sand and clay among bosses of rock (schist) most of which were below the ancient water-level.

The major portion of the island consists of the gneiss and

schists, the general trend ("strike") of which is N.N.E.–S.S.W. These rocks can be studied in almost every excavation for building purposes, and there are numerous excellent exposures of them, which fortunately will never be covered, in Central, Riverside and Morningside Parks and along the Speedway and

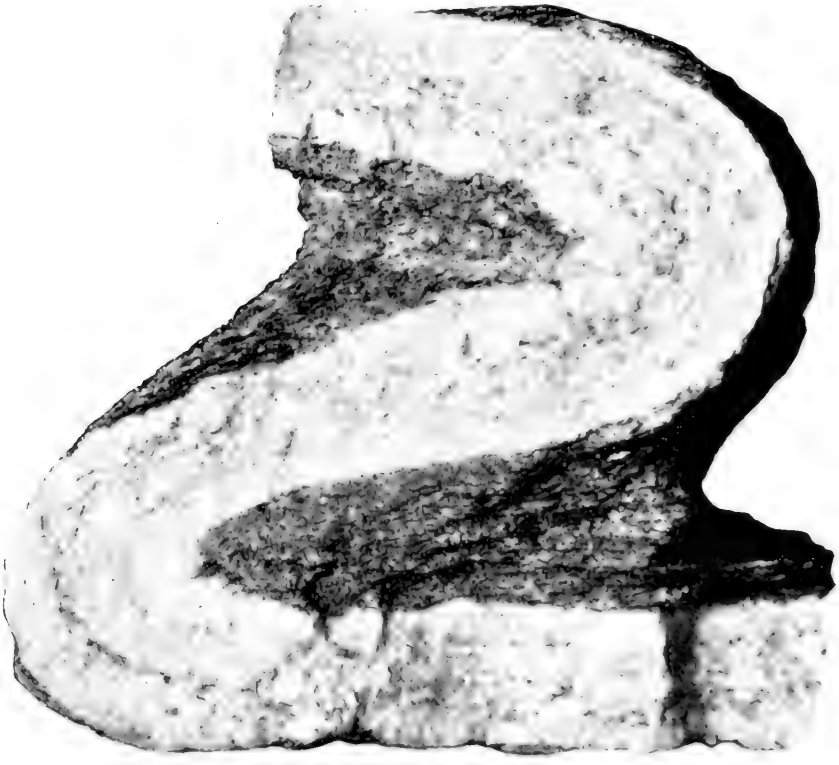
MICACEOUS GNEISS

A block of Fordham Gneiss (Archæan) from the east end of Washington Bridge, N. Y. Closely resembles the gneiss of Manhattan Island. Specimen is 20 inches across.

Lafayette Boulevard. The area of serpentine is very small and is now inaccessible on account of buildings. It is at Tenth Avenue and West Fifty-eighth Street. The magnesian limestone, or dolomite, occurs in zones in Harlem, where it is now almost covered with buildings, and in the Kingsbridge section of the island, where a good exposure may be seen along the Spuyten Duyvil ship-canal.

The exact distribution of these rocks can best be learned from a study of the geological map of New York City and vicinity

which has been placed beside the local rock collection in the Hall of Geology. The collection has been arranged in two cases. One of these shows the kinds of rocks encountered when crossing the island from east to west at several points, while the other shows nearly all the varieties of rock which have been found in ledges on Manhattan Island. Three sections of borings, further-



QUARTZOSE VEIN IN MICACEOUS GNEISS

West End Avenue near Sixty-third Street. Specimen is $5\frac{1}{2}$ inches across.

more, show the rock found at considerable depths at widely separated points, and prove that there is no change from the surface.

The mica schists and gneisses are now considered by geologists to be shales and other clayey rocks of Hudson River (Lower Silurian) age which have been altered to their present crystalline

condition by heat and pressure combined with motion. The crystalline limestone, which is almost a marble in some beds, is much older, geologically speaking. Its present condition is due to the severe metamorphism which it has undergone in company with the schists. The hornblende schists are considered to be of igneous origin, which would indicate that this region experienced volcanic activity millions of years ago. These schists occur in comparatively small detached areas and are the highly metamorphosed representatives of the molten lava, which was forced into cracks in the old sedimentaries and solidified in the form of trap dikes or was poured out upon the ancient surface in sheets. The hornblende schist may be distinguished from the inclosing mica schist by its darker color, due to the abundance of black hornblende. Actinolite and tremolite schists occur in company with some of the hornblende schists. East of the Harlem River and north of Spuyten Duyvil Creek there is a gneiss resembling some of the Manhattan Island gneiss in appearance, which is older than that and antedates even the magnesian limestone.

The minerals of Manhattan Island are, for the most part, silicates of complex chemical composition, and they vary with the nature of the rock with which they are associated. It is comparatively easy, therefore, to group them according to their occurrence into the minerals of (*a*) the gneisses and mica schists, (*b*) the hornblende schists, (*c*) the granite and pegmatite veins and dikes, (*d*) the limestone beds and (*e*) the serpentine area, and this subdivision has been followed in the arrangement of the collection. In connection with the study of the specimens the visitor will do well to consult the geological map of New York and vicinity attached to the case and the chart showing the distribution of mineral localities on Manhattan Island which has been placed in the case. The chart is reproduced herewith.

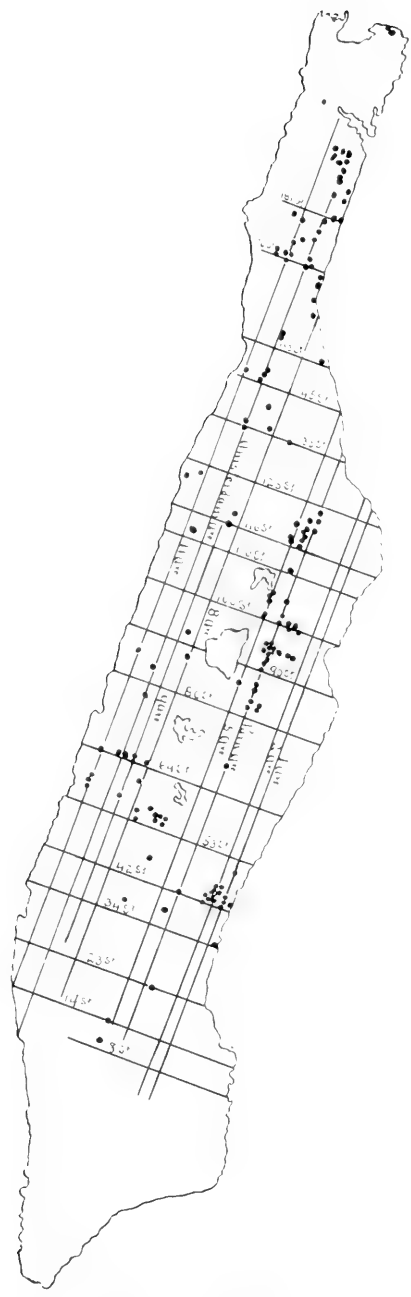
The minerals of the gneisses and schists are primarily quartz, feldspar and mica, the last predominating. In this association these minerals rarely occur upon Manhattan Island as handsome cabinet specimens, but there occur with them, as secondary effects of the metamorphism of the original beds, fibrolite, epidote and other species. Crevices in the schists have given

opportunity for the formation from circulating waters of interesting little globules of sphærosiderite and several members of the group of zeolites, such as heulandite, harmotome, stilbite and chabazite. The stilbite occurs in noteworthy rosettes of slender, blade-like yellowish brown crystals upon the surface of the rock. These zeolites are particularly interesting for study in comparison with the remarkable specimens of the same species which have come from the cavities in the trap rock (diabase) of the neighboring Palisades.

The chief cabinet mineral of the hornblende schists is sphene, which occurs in showy groups of yellowish green, flattened crystals. The principal constituent of the schists, however, is black hornblende, which occurs in needle-like crystals. Epidote too and actinolite are often found in this rock. Exposures may be seen in Morningside Park and the Fort Washington Heights section of the city, but most other localities have been covered with buildings or streets.

The granite and pegmatite veins or dikes are the principal contributors to the local mineral collection. The origin of these rocks is still a mooted point, but probably some of them are acid igneous intrusions, while others, particularly the pegmatites (characterized by their coarseness of crystallization), are the result of chemical precipitation from circulating waters. First to be mentioned are orthoclase, microline, oligoclase and albite among the feldspars; muscovite and biotite among the micas, and quartz. Garnets of small size are scattered all through the schists, but gigantic crystals of this mineral have been found in the pegmatite veins, the largest of which came from an excavation in West 35th Street between Broadway and Seventh Avenue. This garnet is a nearly perfect crystal six inches in diameter and weighs nine pounds ten ounces.

Black tourmaline is an abundant constituent of the schists, and it occurs in beautiful crystals in the pegmatites. Sometimes the minute, flattened crystals imbedded between plates of muscovite have been mistaken for the rare mineral dumortierite. Large crystals too have been found. An imperfect one, twelve inches long and five inches across, is in the Club collection, while a crystal of almost ideal development, about ten inches long and



SKETCH MAP OF MANHATTAN ISLAND

The dots indicate the situation of the principal mineral localities.

four inches in diameter, from near Fort Washington Avenue and 171st Street, is in the general Museum series.

Among other species which have been found in the granite and pegmatite veins mention may be made of allanite in the form of the long, lath-like crystals known as orthite, apatite, beryl, cyanite, dumortierite, iolite, monazite, ripidolite, wernerite, xenotime and zircon. Monazite is a compound of the rare elements cerium, lanthanum and didymium with phosphoric acid, and is the source whence the impregnating substance for the mantles of incandescent gas lights is obtained. Uraninite, or pitchblende, the chief source of radium, occurs on the island. Galena, the sulphide of lead, has been found in minute crystals on crystals of chabazite. Gypsum in radiating crystals on mica schist is one of the oddities of the collection, and fluorite (from the Subway) is another. Chrysoberyl, too, has been found in one locality. Azurite and malachite occur rarely on the island.

The limestone beds have furnished the collection with malacolite (white pyroxene), brown tourmaline and pretty groups of crystals of smoky quartz. Fibrous aragonite has been taken from thin veins in the limestone.

Finally, the serpentine area yields an intimate mixture of calcite and serpentine resembling the spotted green and white rock called ophio-calcite. Large specimens of this peculiar rock may be seen in the local rock collection in the Hall of Geology. At one time this mixture aroused considerable interest from the erroneous supposition that it corresponded with the famous Canadian "fossil" of Archæan age, *Eozoön Canadense*.

A complete list of the minerals of Manhattan Island would include the names of nearly one hundred species and varieties, and the region has been one of the most prolific in kinds in the world. Although most of the ground is now inaccessible, that which remains offers inducement to the diligent collector to search for mineral treasures to add to his cabinet.

EDMUND OTIS HOVEY.

MR. CHARLES B. CROOK has presented the Museum with an elaborate feathered head-dress, once worn by an East African chieftain.

DEPARTMENT OF VERTEBRATE PALÆONTOLOGY, EXPLORATIONS OF 1905.

THREE parties were sent into the field by the Department of Vertebrate Palæontology during the past summer. They carried on explorations and excavations in Montana, in central Wyoming and in southern Wyoming.

The party in southern Wyoming under Mr. Walter Granger went out especially in search of remains of the animals which lived in the Middle Eocene period in the region around the now abandoned military post of Fort Bridger. This classic locality has been explored from time to time since 1870, particularly large collections having been secured by Professor Marsh of the Yale Museum, by Professor Cope and by the Princeton Museum. American Museum exploring parties visited the region in 1893 and 1895 and again every season from 1903 to 1905, always seeking for remains of the so-called "mountain horse," or *Orohippus* of Marsh, an important stage in the development of American horses. After these six years of the most painstaking search, which were rewarded by the discovery of a great variety of other animals but by few or no remains of the horses, on the very last day of the final expedition, just as the search was being given up, the long-looked-for horse was discovered, the find consisting of the skull, limbs, backbone and other parts of the skeleton of the very stage which was needed to fit into the remarkable series which the Museum has been bringing together. Other valuable specimens were secured besides the "mountain horse." The most important of these were a nearly complete skeleton of one of the large carnivores of the period, a nearly complete skeleton and the skull of the running rhinoceros of the period, *Hyrachyus*, an unusually perfect skeleton of a rodent and a skull which may prove to be that of one of the Bridger monkeys. The staff of the expedition included Messrs. Miller of this Museum and Sinclair of the Museum of Zoölogy at Princeton.

The work of this season completes the very thorough survey of the ancient Bridger basin to which this Museum has now de-

voted six arduous years, beginning with the explorations of Dr. Wortman and ending with those of Mr. Granger. As a result of this work the geology of the basin is now thoroughly understood. It divides into a series of great steps or substages, each of which is distinguished by its own peculiar forms of life or of specific stages. Only in the upper stages do the great horned Uintatheres appear for the first time. During the season of 1904 the Museum secured the most complete skeleton thus far found of a Uintatherium, including the fore and hind limbs. This will now be mounted with the aid of certain portions of the type specimen of *Dinoceras mirabile* in the Yale Museum.

The party sent to central Wyoming under Mr. Peter Kaisen had a somewhat similar experience. They were exploring the "Bone Cabin" dinosaur quarry which has yielded such remarkable results during the past seven years. The output this season was in general singularly disappointing, indicating that the quarry was gradually playing out; but at the last a single find was made which repays the entire efforts of the whole season, consisting of the skeleton of one of the smaller Iguanodont dinosaurs remotely related to the famous Iguanodonts which are preserved in the Royal Museum of Brussels from the Bernissart quarries.

The work of this season ends our explorations in the Bone Cabin dinosaur quarry. Together with the fine specimens which have been found in other parts of Wyoming this quarry has given us an almost complete picture of the life of the Jurassic period, so that it has been decided to devote an entire hall to the animals, great and small, of this one stage in the history of the earth. In this hall the most imposing specimen will be the Brontosaurus, already mounted. Near it will be placed the skeleton of the carnivorous Laosaurus, part of the Cope collection presented to the Museum by President Jesup. This skeleton will be mounted in a unique manner upon the prostrate bones of another specimen of Brontosaurus which was found in the Como Bluffs in 1897. Materials are collecting for the mounting of *Diplodocus* and *Camarasaurus* or *Morosaurus*. The Bone Cabin quarry had yielded remains sufficient with some restoration from other skeletons to mount *Stegosaurus* entire. The speci-

mens above mentioned will give us a typical Iguanodont. The small "bird-catching" dinosaur of the period, *Ornitholestes*, is already mounted.

It is proposed to place these skeletons in the central portion of the hall, and in the side cases to exhibit the less complete skeletons and the anatomy of the limbs and other parts of the body, together with diagrams showing the localities in which the famous specimens have been found. It will, however, require several years' work in the laboratory before this exhibit can be completed.

It has not yet been possible to examine either the horse or the Iguanodont skeleton in the Museum, but as soon as they reach the East work will be begun upon them.

The most striking success of the year, however, attended the expedition to Montana. In 1902 Mr. Barnum Brown, who was in charge of this party, found a few remains of a very large carnivorous or flesh-eating dinosaur, imbedded in hard sandstone. The materials which were secured then included a portion of the skull and jaws, a few of the vertebræ of the backbone, part of the hip girdle and portions of the limbs. The fact that they represented such different parts of the body encouraged the hope that further exploration would reveal additional materials. Accordingly instructions were given that clearing and blasting above the locality where the specimen was found should be instituted on a large scale. As a result of this work as the summer wore on the additional remains of this great animal came to light, so that representative portions of the entire body have been secured by the Museum. The animal proves to be of gigantic size, the total length being estimated at 39 feet, the height of the skull above the ground at 19 feet. The new dinosaur is, in fact, the largest carnivorous land animal which has thus far been discovered. In reference to this powerful construction Professor Osborn has given it the name *Tyrannosaurus rex*, or the "king tyrant saurian." It was probably adapted to preying upon the great horned herbivorous dinosaurs of the period, known as Ceratopsia. This remarkable skeleton will be worked out and placed upon exhibition as soon as possible. It will form a worthy companion-piece to the great Brontosaurus.

TWO NEW BIRD GROUPS.

THE most recent additions to the splendid series of groups of North American birds which the Museum owes to the generosity of a number of contributors to a fund designed especially for exhibits of this nature represent the White-crowned Pigeon and the Ani.

The White-crowned Pigeon is a West Indian species which visits the Florida Keys in great numbers to nest in the smaller islets. In the Bahamas it is also migratory, appearing in May and frequenting the same localities year after year.

This Pigeon belongs to the same genus (*Columba*) as our dovecote Pigeon, and it is quite probable that in the warmer parts of the world it could be domesticated.

The flesh of this handsome bird is most palatable, and large numbers are annually killed for food in both the Florida Keys and Bahamas. Unfortunately, this great destruction of life occurs during the nesting season, but the fact that the birds are present only at that time has prevented, in the Bahamas, at least, the passage of laws prohibiting their killing.

The Ani is a species of Cuckoo common throughout the greater part of tropical America and occasionally reaching southern Florida. This bird is exhibited because of its remarkable nesting habits.

It does not mate in pairs, as do most birds, but the four to a dozen or more birds composing a flock live together throughout the year, building a common nest in which all the females lay their eggs. Twenty-one eggs have been found in a single nest, but the number laid by each individual is unknown. All the members of this singular family seem to take part in the duties of incubation and care of the young. The nesting season extends over several months, and fresh eggs may be found in a nest which contains young birds. It appears to be the universal custom of Anis to line their nests with fresh green leaves.

Little has been written about the nesting habits of the White-crowned Pigeon or Ani, and so far as we are aware the groups above-mentioned are unique.

MODELS OF MARTINIQUE AND MT. PELÉ.

THE Department of Geology has recently placed on exhibition a series of models illustrating the Island of Martinique and the effects of the eruptions of Mt. Pelé. There are four models in the series, comprising the whole island upon a scale of 1:80,000, modeled from the chart of the French Admiralty, and three enlarged models of the volcano itself, upon a scale of 1:24,000, or 2,000 feet to the inch, prepared from the same chart and photographic and other data obtained for the Museum in 1902 and 1903 by Dr. E. O. Hovey, Associate Curator of Geology. In all the models the vertical scale is the same as the horizontal. The first of the large-scale models shows the volcano as it was before and at the time of the first great eruption, that of May 8, 1902, which destroyed the city of St. Pierre and its inhabitants. The second large-scale model shows the changes which took place in the volcano in the succeeding months and includes the devastation wrought by the eruption of August 30, 1902. The third large-scale model shows the wonderful spine and cone of lava which was pushed out of the conduit and crater during the winter and spring of 1902 and 1903, the time selected for representation being April 2, 1903, which was at the period of maximum development of the strange structure. The models were prepared at the Museum by the Department of Preparation and Installation. They should be studied in connection with the 118 cases of specimens from Mt. Pelé and the window transparencies.

AMERICAN TUBERCULOSIS EXHIBITION.

FROM November 27 to December 9 one of the exhibition halls of the Museum was placed at the disposal of the National Association for the Study and Prevention of Tuberculosis and the Committee on the Prevention of Tuberculosis of the Charity Organization Society of New York for the purpose of exhibiting the practical work of the Association and the Committee, and demonstrating the methods that have been adopted to limit the spread of a terrible but preventable disease, and to cure persons

already suffering from it. The exposition consisted of exhibits of models, photographs, charts and diagrams from all over the country, and they showed that by far the most and the best work is being done in the city of New York by private as well as public institutions. Models of ward and pavilion tents from various hospitals, an out-door pavilion from Bellevue and photographs showing the treatment at hospitals and dispensaries where special work against tuberculosis is carried on formed an important part of the exposition.

The work of the tenement commission along the lines of preventing the spread of disease by ameliorating the conditions of living was illustrated by models, photographs and statistics. One exhibit consisted of the reproduction of a typical "dark room" in an inside tenement, and of a similar room under the new conditions imposed by the recent law compelling the admittance of daylight to such rooms. Unfortunately there are more than 300,000 such dark rooms still existing in the city. The character of the treatment of tuberculous patients at Saranac Lake, Stonywold and other sanitaria in the State was illustrated by means of photographs.

Great progress has been made at the Clinton State Prison in the treatment of consumption, which is one of the greatest scourges of penal institutions. The model of a ward for consumptives in the Clinton Prison was a feature of the exposition. Outside of New York City and State, Boston and Chicago are the principal cities carrying on a definite campaign against tuberculosis, and much work is being done in Massachusetts outside of Boston and in Maine, Rhode Island, Connecticut, Pennsylvania and Colorado.

The exposition was opened by public exercises in the Museum auditorium at which addresses were made by Talcott Williams, Esq., of Philadelphia, Doctor Thomas Darlington, Commissioner of Health in New York City, and President Morris K. Jesup. On Wednesday evening, November 29, a special meeting devoted to tuberculosis and the trades was held at which the principal address was given by Mr. Graham Taylor of Chicago, and short addresses were made by official delegates from the Central Federated (labor) Union. On Friday evening, December

1, there was a special meeting for physicians at which addresses were made by Dr. Lawrence Flick of Philadelphia, Dr. W. A. Evans of Chicago, Dr. A. Jacobi of New York and Dr. Vincent F. Bowditch of Boston. On Friday evening, December 8, a meeting expressly for the teachers of the public schools was held with the coöperation of the Board of Education of the city of New York, at which the principal address was delivered by Dr. S. A. Knopf of New York.

From here the exposition was transferred to Boston, and from there it is to go to Philadelphia, Chicago and other large cities throughout the country for the enlightenment of the people in the present wide-spread campaign against tuberculosis.

MUSEUM NEWS NOTES.

THE Department of Entomology has received as a gift from William Schaus, Esq., formerly of New York City, a valuable collection of moths embracing some 26,000 specimens, mainly from Mexico, Central America and South America. This collection is the result of about three years of assiduous search, much of which was done under the personal direction of Mr. Schaus, who is a tireless traveler and an enthusiastic entomologist. Four years ago the Museum received from the same gentleman a collection of 5000 butterflies, including many rare specimens from Europe, Asia, Africa, Australia and New Zealand.

THE Department of Ethnology has received as a gift from George S. Bowdoin, Esq., a member of the Board of Trustees, a valuable collection illustrating the fast-disappearing culture of some of the tribes of Central Africa. The collection includes implements of warfare, idols, fetiches and masks, clothing, baskets and musical instruments, household utensils of bamboo, pottery and brass, bracelets, necklaces and household adornments of beads, shells and brass. A large gold bead weighing three ounces and seven carved ivory tusks from Ashantee are worthy of particular mention.

THE Museum has recently acquired a collection of South American pottery containing nearly 200 pieces of black-ware coming from about thirty miles southwest of Supia, Colombia, in the valley of the Cauca River, which is a tributary of the Magdalena. This pottery is washed out and cast aside by the Indian placer miners who wash (sluice) the ancient burial grounds of the valley for the purpose of obtaining the antique gold objects which are frequently found in the graves and which are valued solely for the metal. This pottery is remarkable for its strong modeling, but poor technique. It represents conventionalized forms of armadillos, monkeys, frogs, snakes, spiders, lizards, sloths and other animals indigenous to the region, as well as human figures. Some of the pieces show a strong sense of humor on the part of the maker. The representations of human beings are particularly instructive from the data which they furnish with reference to the use of various personal ornaments and utensils, which have been found in the country.

THE collections of the Department of Geology have been enriched during the past quarter by the accession of considerable material from the Lewis and Clark Exposition at Portland, Oregon. This material includes valuable series of gold, silver and copper ores, oils and other economic products from the State Commissions of Utah, Wyoming, Idaho and California, together with extensive series illustrating the mines of Oregon and Montana and the work which was carried on under the auspices of the U. S. Geological Survey upon the black sands which occur in remarkable abundance along the Pacific coast. These sands have been shown to carry commercially valuable amounts of iron ore (magnetite), monazite and garnet; some of the sands containing also gold and platinum.

THE economic collections of the Museum have received an important loan exhibit in the form of a series of about one hundred samples of peat and the briquettes made from peat, lignite (brown coal) and coal slack. The series was collected by H. H. Wotherspoon, Jr., and was made for the purpose of

showing the commercial possibility of utilizing local supplies of cheap fuel material where the price of good coal is too high to permit its consumption.

THERE has been placed on exhibition a group of Texas rattlesnakes, the material for which was collected by Professor Wheeler and Doctor Dahlgren on a trip to Arizona last spring.

MODELS of two of our commonest and most beautiful forms of colonial Polyzoa have been prepared by Dr. B. E. Dahlgren, assisted by Mr. H. Mueller. Dr. Dahlgren has also completed a model of a rotifer, enlarged about 700 times, which shows one of these microscopic forms of low animal organism. These models are on exhibition in the Synoptic Hall, No. 107, of the ground floor.

THE Department of Mammalogy received in December a series of eight hippopotamus skulls showing various stages of growth from the young to the adult from Lake Ngami, South Africa. The largest of the series represents an animal of about the size of "Caliph" in the Central Park Menagerie. The department has also secured four huge giraffe skulls from Bechuana Land, South Africa. Comparison with the skull of the Museum's mounted giraffe skeleton shows that these newly acquired skulls must have belonged to animals 18 feet high, or half again as large as the mounted specimen on exhibition in the Museum.

THE Philippine wood collection has been removed to the corridor on the ground floor leading from the North Wing to the engine room, where it will be installed in a manner to show to the best advantage the beautiful grains and colors of the specimens. This collection is the most complete that ever has been made, and it represents all the woods of the Philippines which are valuable for manufacturing purposes.

THE annual meeting of the National Association of Audubon Societies, Mr. William Dutcher, President, was held in the Museum, October 31, members being present from Massachusetts, Rhode Island, Connecticut, New York, New Jersey, District of

Columbia, North Carolina and Oregon. The sessions were well attended, and the members were enthusiastic over the sound financial condition and the bright prospects of the Association.

THE Twenty-third Congress of the American Ornithologists' Union was held in the Museum, November 13 to 16, under the presidency of Mr. Charles F. Batchelder. There are now about nine hundred members of the Union, and the attendance at this Congress was greater than at any previous session. Many valuable papers were read, and a feature of the convention was an informal reception in the Museum.

AMERICAN MUSEUM BULLETIN, VOLUME XXI.

DURING the year 1905 the twenty-first volume of the BULLETIN of the Museum has been published. The articles are also published separately and may be obtained at cost prices from the Librarian. The table of contents of the volume is as follows:

LECTURES.

MEMBERS' COURSE.

The second course of lectures for the season 1905 and 1906 to Members of the American Museum of Natural History and persons holding complimentary tickets given them by Members will be given during February and March. The programme for the course will be issued in January. The lectures will be delivered on Thursday evenings at 8:15 by members of the scientific staff of the Museum and will be fully illustrated by stereopticon views.

PUPILS' COURSE.

The programme of the first course of lectures to the public school children for the season, was as follows:

	Oct.	Nov.	Dec.	
Monday,	16,	13,	11.	—Mr. G. H. Sherwood, "A Tour of Our Philippine Possessions."
Wednesday,	18,	15,	13.	—Mr. H. I. Smith, "Methods of Transportation—Past and Present."
Friday,	20,	17,	15.	—Prof. M. H. Saville, "A Trip Through Mexico to Panama."
Monday,	23,	20,	18.	—Mr. G. H. Pepper, "Life Among Our Indians."
Wednesday,	25,	22,	20.	—Mr. F. M. Chapman, "City Bird Life."
Friday,	27,	24,	22.	—Mr. G. H. Sherwood, "The Industries of the United States."
			Jan.	
Monday,	30,	27,	8.	—Mr. L. P. Gratacap, "The Development of New York City."
	Nov.			
Wednesday,	1,	29,	10.	—Dr. E. O. Hovey, "The Work of Water."

	Nov.	Dec.	Jan.	
Friday,	3,	*	12.	—Mr. R. W. Miner, "Travels Through Western Europe and British Isles."
Monday,	6,	4,	15.	—Dr. E. O. Hovey, "The Physical Divisions of the United States."
Wednesday,	8,	6,	17.	—Mr. C. W. Mead, "Our South American Neighbors."
Friday,	10,	8,	19.	—Mr. R. W. Miner, "In the Nile Country."

The second course for the season will be given during the spring months according to a programme which will be announced in February.

These lectures are open to public-school children accompanied by their teachers and to the children of Members on the presentation of their membership tickets. Particulars regarding this course may be learned by addressing the Director of the Museum.

LEGAL HOLIDAY COURSE.

Upon the four principal legal holidays occurring during the winter season the Museum has, for many years, given lectures free to the public, no tickets being required for admittance. The programme for the current season follows. The doors are open at 2.45 P.M., and the lectures begin at 3.15 P.M.:

Thanksgiving Day, November 30, 1905.—Prof. Albert S. Bickmore, "Antwerp, Brussels and Waterloo."

Christmas Day, December 25, 1905.—Dr. Edmund Otis Hovey, "Northern Mexico: Its Deserts, Plateaux and Canyons."

New Year's Day, January 1, 1906.—Prof. Albert S. Bickmore, "The Philippines—Manila."

Washington's Birthday, February 22, 1906.—Prof. Albert S. Bickmore, "The Philippines—Luzon."

PEOPLE'S COURSE.

The second course of Free Lectures to the People, which are given Tuesday and Saturday evenings in coöperation with the Department of Education of the City of New York, will begin in January according to the following programme:

Tuesday evenings at 8 o'clock.

A course of lectures on the geography of Eastern Countries.

*On account of the Thanksgiving holidays the lecture was omitted on December 1.

January 9.—Dr. LEWIS GASTON LEARY, "Jerusalem." Illustrated by stereopticon views.

Three lectures by Mrs. CASSANDRIA A. HAYNES:

January 16.—"To and Fro in Babylon." Illustrated by costumes.

January 23.—"Bedouin Arabs and Things Seen among Them." Illustrated by costumes.

January 30.—"In Reed Encampments." Illustrated by stereopticon views.

Four lectures on Egypt: Life, Religion, Art and Symbolism, by Prof. WALTER SCOTT PERRY, of Pratt Institute. Illustrated by stereopticon views:

February 6.—"The Nile Valley. The City of Cairo. Native Village Life. Agriculture. Mounds and Excavations. Religion, Writing and Symbolism of the Ancient Egyptians."

February 13.—"Ancient Thebes. The Wonderful Temples of Luxor and Karnak. Ceremonies and Festivals. The Temple of Edfu."

February 20.—"Ancient Memphis. The Pyramids. Tombs of the Early and Middle Empires and the Significance of Their Remarkable Decoration."

February 27.—"The Memorial Temples of Thebes. The Tombs of the Kings. Decoration and Symbolism. Sculpture and Ornament. Influence of Egyptian Art."

Saturday evenings at 8 o'clock. All lectures illustrated by stereopticon views.

Three lectures on entomology by Prof. JOHN B. SMITH, of Rutgers College:

January 6.—"Insects and Their Transformations."

January 13.—"Insects in Their Relations to Plant Life."

January 20.—"Insects in Their Relation to Man and to Other Animals."

Five lectures on the solar system by Prof. ROBERT W. PRENTISS:

January 27.—"The Sun: Its Phenomena."

February 3.—"The Sun: Spectrum Analysis, Light and Heat."

February 10.—"The Moon: Its Appearance, Motions, Scenery and Physical Condition."

February 17.—"The Planets: Their Telescopic Appearance and Physical Condition."

February 24.—"Comets and Meteors: Their Mutual Relations."

The lectures of the People's Course are open free to the public and no tickets are required for admittance, except in the case of children, who will be admitted only on presentation of the ticket of a Member of the Museum. The doors are open at 7:30 o'clock and close when the lectures begin.

The programme of the third course of the Public Lectures will be issued by the City Board of Education in February.

MEETINGS OF SOCIETIES.

THE meetings of the various societies that make the Museum their home will be continued until May. Papers on technical and general scientific subjects are read at these meetings. The papers and discussions are often of popular character and are always of considerable general interest. The public is invited to attend the meetings, and Members of the Museum will be provided with programmes on making request of the Director.

The New York Academy of Sciences holds its meetings on Monday evenings at 8:15 o'clock, as follows:

January 8.—Business meeting and section of Geology and Mineralogy.

January 15.—Section of Biology.

January 22.—Section of Astronomy, Physics and Chemistry.

January 29.—Section of Anthropology and Psychology.

For the remainder of the season the Academy will hold its meetings in the following order:

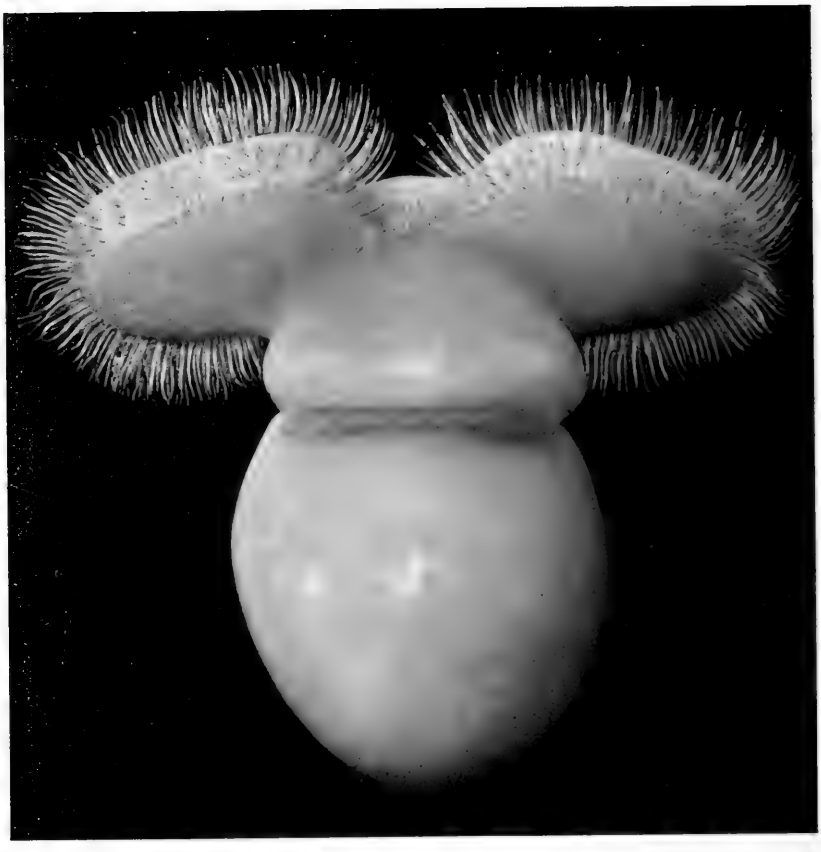
First Mondays.—Business meetings and section of Geology and Mineralogy.

Second Mondays.—Section of Biology.

Third Mondays.—Section of Astronomy, Physics and Chemistry.

Fourth Mondays.—Section of Anthropology and Psychology.

On Tuesday evenings and at other times as announced by the Secretary meetings are held by the New York Linnean Society, the New York Mineralogical Club and the New York Entomological Society.



MODEL 21. FRONT VIEW

The fully formed mollusk larva, or veliger.

THE DEVELOPMENT OF A MOLLUSK.[1]

A GUIDE TO THE SERIES OF MODELS ILLUSTRATING THE DEVELOPMENT OF CREPIDULA.

By B. E. Dahlgren, D.M.D.,
American Museum of Natural History.

Introduction.

THE problem of how living organisms arise must have ever presented itself to the questioning mind. The processes involved in the origin of new individuals nevertheless remained for ages an unsolved mystery. The most familiar example, the origin of the young bird from an egg, cannot have failed to arouse the interest even of primitive man. It must also have furnished the first suggestion towards an explanation. Although undoubtedly long unsuspected, in time it became known that every animal which does not multiply by simple division into two like the very lowest arises from an egg, which is either hatched or developed within the body of the parent. Until a century and a half ago it was generally believed that the egg contained a miniature animal, which became perfected during incubation. Not until the substance called protoplasm had been recognized as the universal "physical basis of life," and, by the aid of the microscope, all living bodies had been found to be composed of cells, was anything like a correct understanding of the nature of the egg and its development attained. The egg was found to be a cell derived like all other cells by the division of a preëxisting cell. Its development, resulting in the formation of the myriad cells of a new individual, was found to proceed by a process of cell-division, essentially similar to that by which growth takes place in the adult.

[1] Issued also in separate form as **Guide Leaflet** No. 21.

Out of the discovery of the character of the egg, of its origin from a parent cell and of its processes of development grew numerous other problems demanding the attention of investigators. Thus the science of embryology came into existence. This science seeks to discover every step in the development of an organism and to trace resemblances and differences of structure and form from their very earliest beginnings. It investigates the conditions which influence development and seeks to discover the factors which determine each step in the formation of an organism, to what extent development is dependent upon external causes and to what extent it is predetermined by the internal organization of the egg. It seeks to determine precisely what this internal organization is and to explain the manner in which the reproductive cell becomes the bearer of the characters of the parents and by what process it is able to transmit these to the offspring.

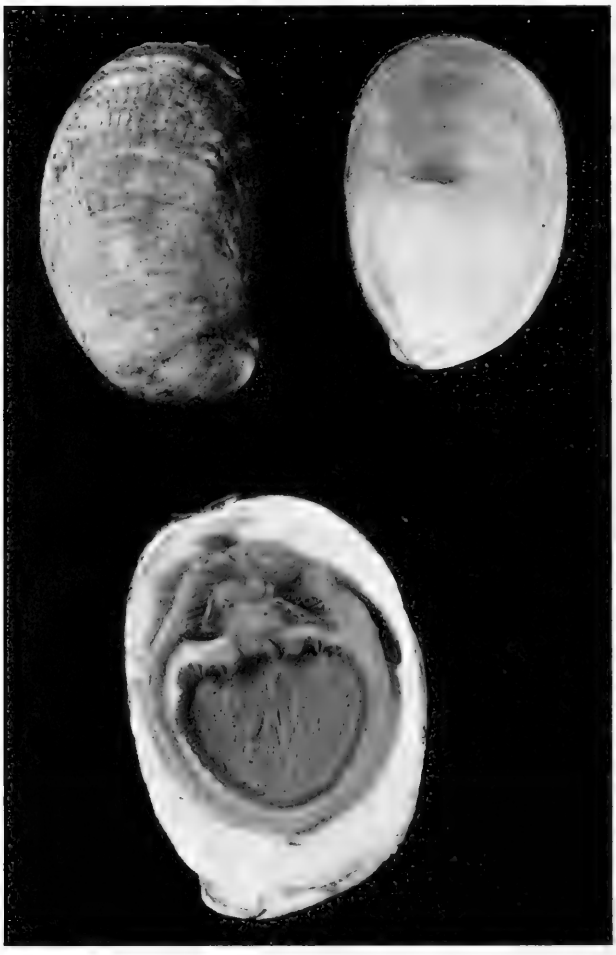
The comparison of the development of different animals soon revealed striking similarities at certain stages. It was found that after cell-division had proceeded to a certain extent the developing egg assumed a form resembling a mulberry (the morula); that later the cells invariably became arranged in the form of a hollow sphere (the blastula), this in turn giving rise to a somewhat more complicated flask-shaped form (the gastrula). It was seen that these various stages presented remarkable correspondences to certain lower forms of life. The analogy of the undivided egg to a simple unicellular protozoan; of the mulberry, or morula, stage to simple aggregations of unicellular animals such as are found among the lowest forms of life; of the blastula to certain Flagellates which occur in the form of hollow, free-swimming, multicellular spheres, and the apparent analogy of the gastrula to certain polyps led to the theory that the developing animal, in the course of its formation from the egg, passes successively through the forms of a whole series of lower organisms which may be considered as its ancestral types.

Formulated at a time when the evolution theory had been recently advanced, this corroborative theory aroused the liveliest interest. Although the original theory has been largely modified since the developmental history of a greater number of

forms has become known, comparisons such as these have thrown much light on the connections existing between various classes of animals, the extent to which developmental histories correspond being, in a degree, an index of relationships.

With a view primarily to increase the embryological evidences of evolution and at the same time to gain a clearer conception of relationships, the development of all the various types began to be traced from the original germ layers. Naturally the conditions which might influence development were considered, and explanations of how the mechanical action of simple physical factors, such as pressure, cohesion and gravity, might tend to cause a dividing egg of a given character to assume successively the various forms through which it passes during development, were soon advanced and received with great enthusiasm. To determine exactly how important a rôle these extrinsic factors play, and the extent to which the future form of an organism is predetermined by the intrinsic character of the egg is evidently of the greatest importance in the solution of the problem of heredity and constitutes at present one of the main problems of embryology .

Although the earlier embryologists were satisfied with simply tracing the origin of the various organs of the body from their primary germ layers which begin to be defined with the gastrula stage, nowadays the solution of the origin of every organ or feature of the body and the significance and factors of every step in development are sought by the most painstaking tracing of the history of every single cell arising by every succeeding division of the egg. It was with a purpose such as this that an elaborate and careful study of the development of *Crepidula* was undertaken by Prof. E. G. Conklin, of the University of Pennsylvania. This study has been followed by the author in constructing for the American Museum of Natural History the series of models described in the present paper.



THE SLIPPER LIMPET OR BOAT SHELL
Crepidula fornicata Lamarck

The Development of Crepidula.

The models represent on a greatly enlarged scale (about 400 diameters) the more important stages in the development of the egg of a gasteropod mollusk of the genus *Crepidula*—the Slipper Limpet, or Boat Shell—common on the coast of the United States. The exceedingly minute eggs (.182 mm. in diameter) are laid in great numbers in capsules secreted by the mollusk. These

capsules, to the number of 50 or 60, each containing about 250 eggs, are united into a grape-like cluster generally found under the shell of the Crepidula attached to the stone or other object upon which it lives its sedentary life. The total number of eggs laid at one time by an animal is about 13,000.

The unfertilized egg (Fig. *a*) is a nearly spherical single cell consisting of a very small amount of protoplasm surrounded by a relatively larger amount of yolk material, mostly in the form of small globules. Within the protoplasm, in a nearly central position, is found the nucleus of the cell. The whole egg is enveloped by a cell membrane.

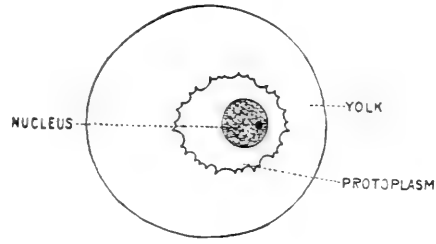


FIG. *a*

The first change which takes place in the egg, preparatory to development, is a migration of the nucleus and protoplasm from a central position toward the upper surface of the egg, the yolk, or deutoplasm, taking its position below it. The egg thus becomes distinctly symmetrical about a vertical axis (Fig. *b*). The upper pole, at which the protoplasm is found, is known as the *animal* pole; the opposite, or lower, as the *vegetative* pole, since

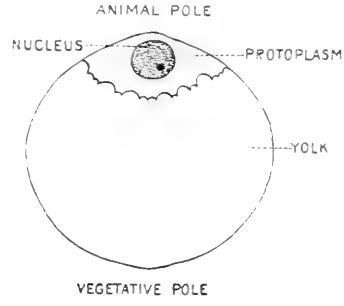
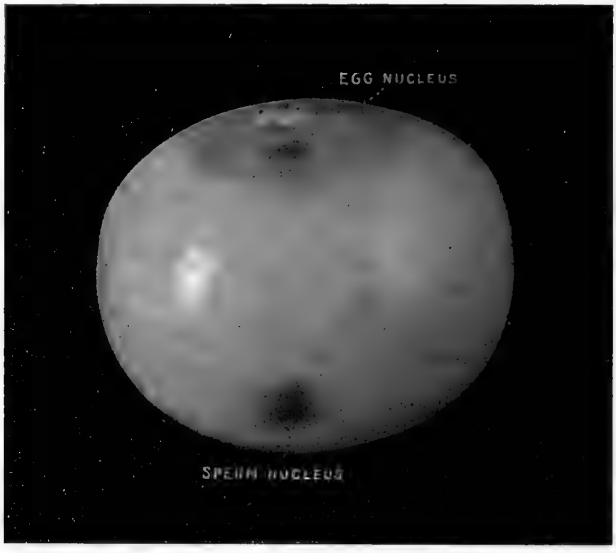


FIG. *b*

about this is collected the yolk or food material contained in the egg. This axis may be followed throughout the development and has been found to correspond to the dorso-ventral axis of the future larva.

About the time of the change in the position of the nucleus and protoplasm, a division of the former takes place. One of the portions resulting from this division, surrounded by a small amount of protoplasm, is extruded at the animal pole, where it remains for a time as a minute body. This is the "first polar



MODEL 1, A

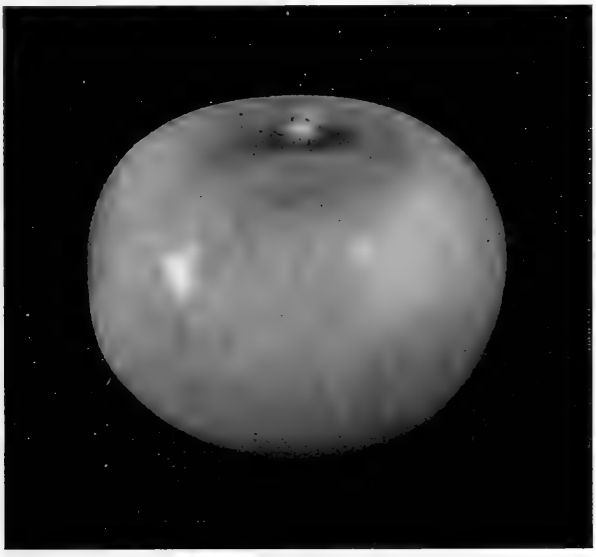
The individual egg showing the clear protoplasmic area above, under the two polar bodies; the yolk with the yolk globules below. In the protoplasm at the animal pole is seen the egg nucleus. The sperm nucleus is represented shortly after entering the lower half of the egg.

body" and is the larger of the two adherent bodies shown in Model 1, B.

This process of division of the nucleus is soon repeated, and a second smaller polar body is extruded. These two polar bodies remain in position for a considerable length of time. Although they do not take any part in the future development, becoming ultimately detached and lost, their elimination is of

particular significance in the preparation of the eggs for fertilization. The process is known as the "maturation" of the egg.

The sperm cells are inclosed with the ova in the capsules. They consist chiefly of a nucleus with a very insignificant amount of protoplasmic substance. A single sperm cell enters the ovum somewhere about the vegetative pole, at the time of the beginning of the maturation process, and its nucleus gradually makes its way upward toward the egg nucleus, until the two nuclei are in contact. These nuclei, known as the "pronuclei" of the egg, may be seen in Model 1,B lying close together in the protoplasm at the animal pole. The egg is now fertilized and capable of developing into a new organism.



MODEL 1, B

The fertilized egg, showing the egg and sperm nuclei in contact at the animal pole. On either side of them are the centrospheres.

Each nucleus is composed largely of a peculiar substance, which has been given the name "chromatin," because of the readiness with which it assumes the stains used for coloring microscopic objects. Though little is known about the definite function and properties of chromatin, its importance is evidently very great, for it is found in the nuclei of all cells. Generally it is

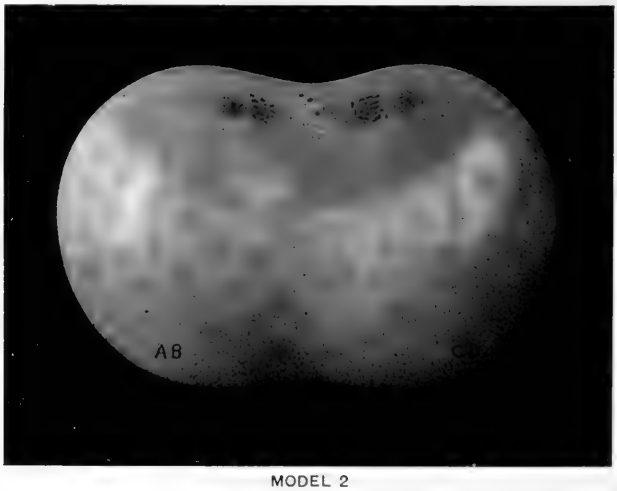
seen as small particles in the form of loops or bands, more or less compactly arranged, and of a definite number in any given species. To these the name "chromosomes" has been given. The division of a nucleus seems to consist mainly in a careful separation of the chromosomes into two equal parts.

There is also present in connection with each nucleus a small body which seems to be the center of all nuclear changes, the "centrosome." Whenever any activity of the nucleus such as a division takes place, the centrosome is in evidence.

Centrosomes are to be observed in both of the pronuclei of the undivided egg, and radiations apparently extend from them to each separate chromosome. The arrangement of the chromatin now becomes looser, and the chromosomes are more widely separated. The centrosomes come to lie in diametrically

FIG. *c*

nuclear boundaries next disappear, the chromosomes become opposite positions with the two pronuclei between them. The



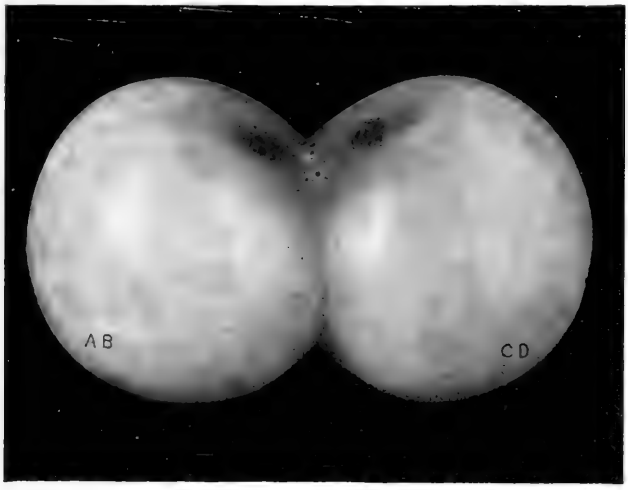
MODEL 2

First cleavage. Separation of chromosomes. Elongation and constriction of the egg preceding its complete division into two cells.

still farther separated, the radiations become more distinct, and soon seem to act on the chromosomes as two sets of fibers. The next step is a separation of every chromosome into two parts, which seem to be drawn in opposite directions toward the two centrosomes. These changes are shown in Model 2 and Fig. C.

In this manner two new nuclei are formed from the pronuclei, each new nucleus being composed of one-half of the chromatin of the male and female pronuclei, and each nucleus having a centrosome.

At the same time that the division of the pronuclei takes place a corresponding division of the whole egg occurs. The egg elongates (Model 2), a constriction takes place, and finally, coincident with the formation of the two new nuclei, there is

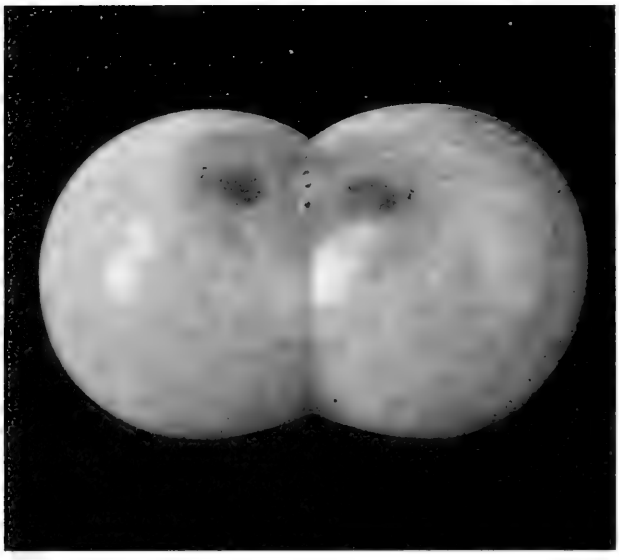


MODEL 3

Completion of first cleavage. Two cells. Polar bodies in the furrow between them. Daughter nuclei and centrospheres in each cell.

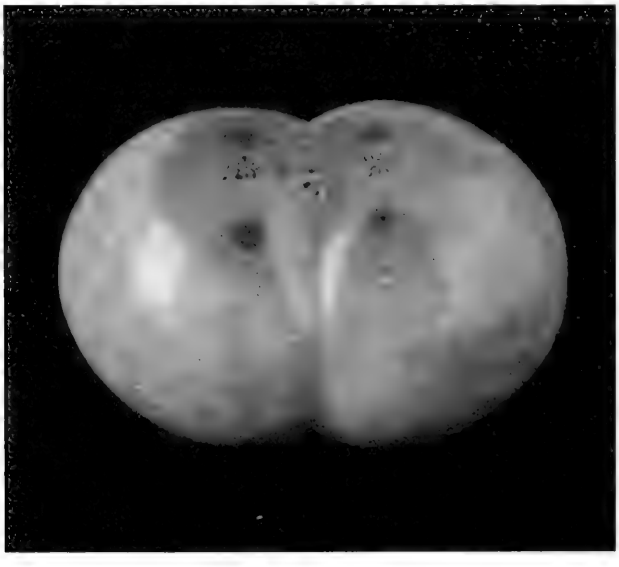
a complete separation of the egg into two halves, forming two new cells, each made up of protoplasm and yolk, like the single undivided egg, and each having a nucleus with its centrosome (Model 3). One of these two new cells gives rise to the anterior portion of the embryo, the other to the posterior.

Beginning with this, the first cleavage, up to the time when the larva is capable of taking in new food, the whole process of



MODEL 4

Resting stage after first cleavage. The two cells flattened against each other.

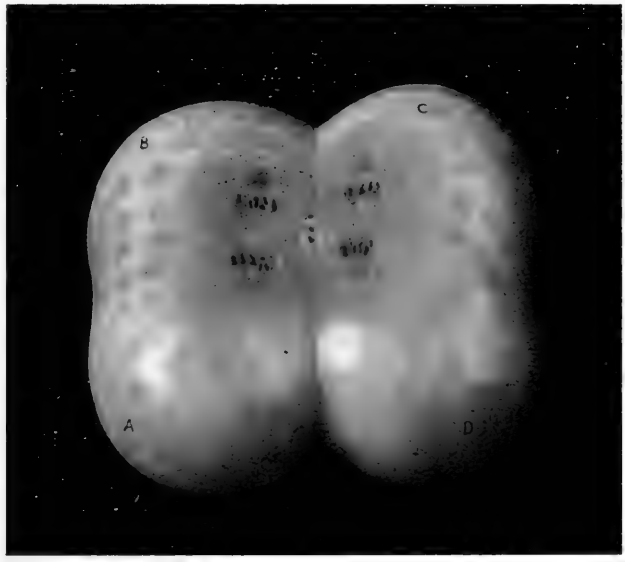


MODEL 5

Beginning of second cleavage. Nuclei resolved into division spindles. This model shows plainly two centrosomes, radiations and the two sets of chromosomes in each cell.

development proceeds through the repeated subdivision of these cells.

The second cleavage, which occurs at right angles to the first, divides the egg and the body of the future larva into right and left halves. This cleavage, initiated by a division of the centrosome, takes place by the changes in each nucleus, followed by an elongation and constriction of the cell. Finally a complete division of each nucleus and each cell into two parts takes place (Models 5 and 6). This gives four new cells, Model 7, each

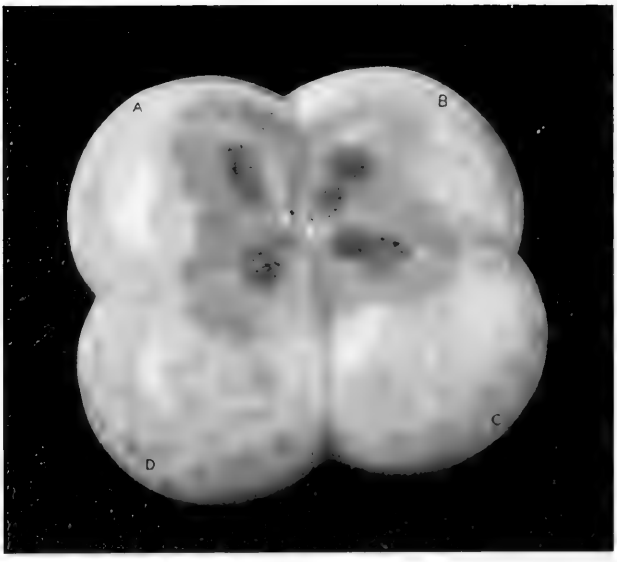


MODEL 6

Second cleavage. Further separation of chromosomes. The two cells elongated and showing a constriction.

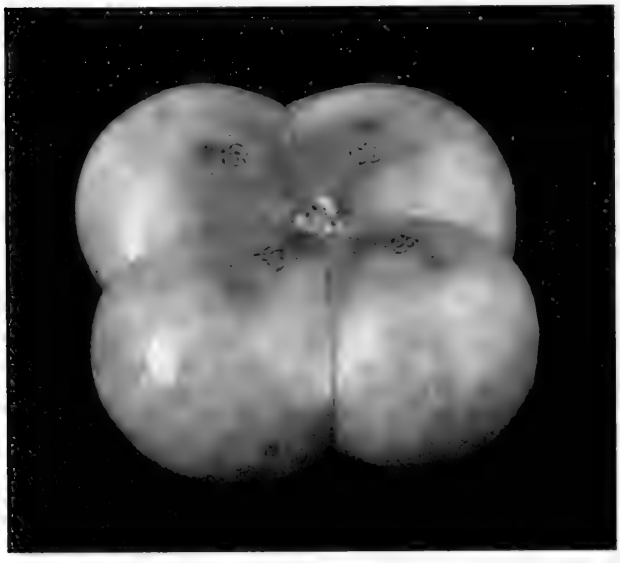
destined to form a definite part of the future organism, but each constituted as far as we can see in a precisely similar manner.

In the next, the third, cleavage the division takes place in a new direction. This, as indicated by the nuclear figures on Model 8, is oblique. Instead of a division into two equal parts, only a portion of the protoplasmic substance at the animal pole separates off, giving rise to four small cells which eventually lie above and slightly to the right of the four lower larger cells. (Model 9 shows the eight cells resulting from this cleavage.)



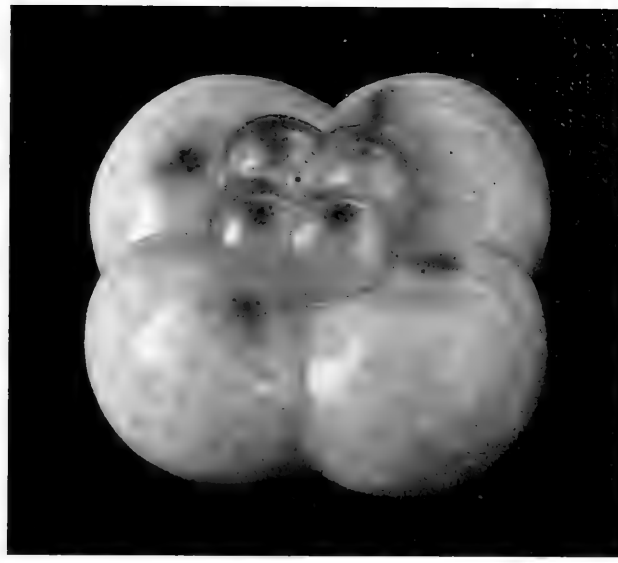
MODEL 7

Second cleavage complete, so that four cells are formed



MODEL 8

Third cleavage. Division spindles radial. The raised surface at the inner end of each spindle indicates the point at which four new cells will be separated off.



MODEL 9

Third cleavage completed. First quartet of small cells or ectoblasts formed.

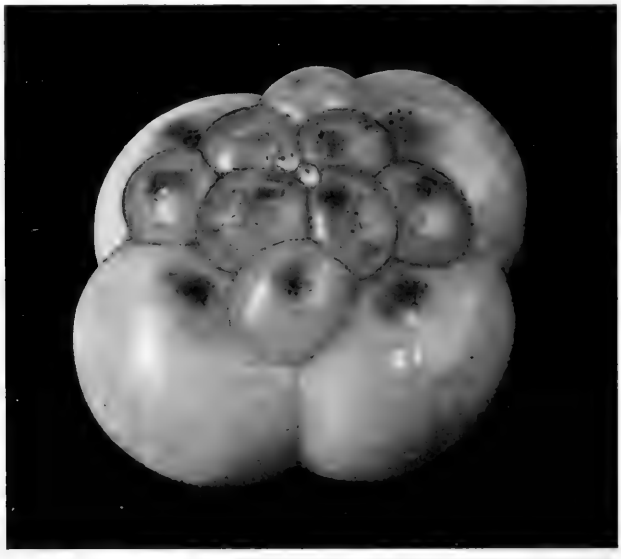
MODEL 10

Fourth cleavage begun.

The fourth cleavage (Model 10) is also oblique. It results in the separation of another quartet of small protoplasmic cells slightly to the left of the large yolk-laden cells and also at the animal pole (Model 11).

The fifth cleavage is simply a division of the first quartet of small cells (Model 12).

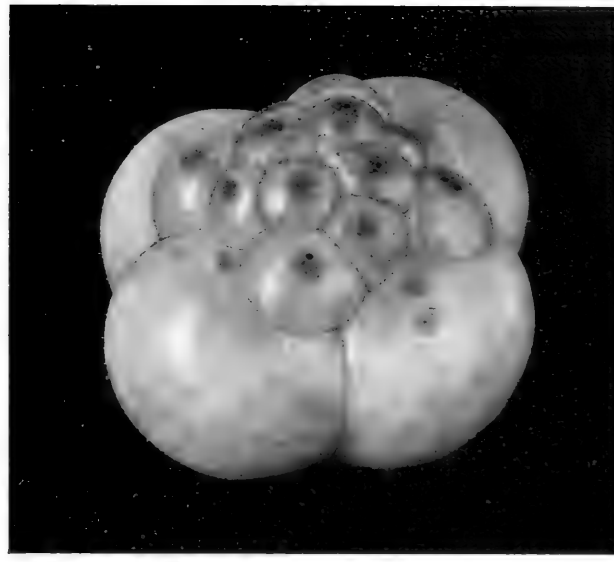
By the sixth cleavage, the beginning of which is shown in Model 12, a third and last quartet of similar small cells is given off at the animal pole. This cleavage also is oblique, but to the right. By this alternation in the direction of each cleavage



MODEL 11

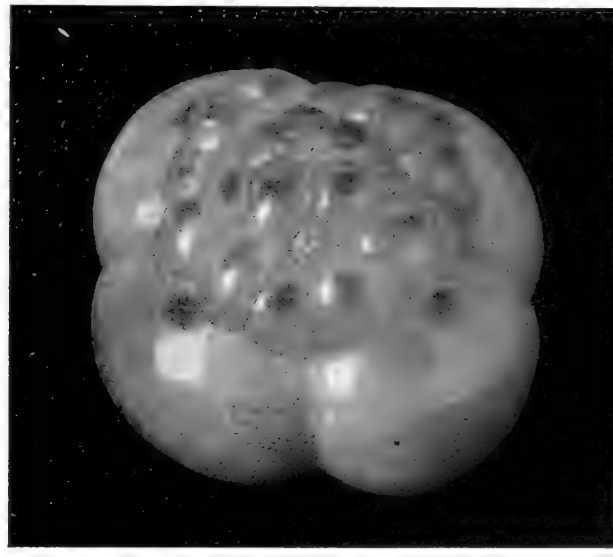
Fourth cleavage completed. A second quartet of ectoblasts formed. Division beginning in cells of first quartet. Fifth cleavage begun.

plane, which began with first cleavage as indicated by the rotation of nuclei to the right, or in a clockwise direction on Model 4, the symmetrical arrangement of the cells is maintained. Lying at the animal pole of the egg, these three quartets of small cells form the so-called dorsal plate, which, by rapid multiplication of cells by division, is destined to grow until it completely covers the egg and forms the outer layer or ectoderm of the embryo. These cells are therefore known as "ectoblasts."



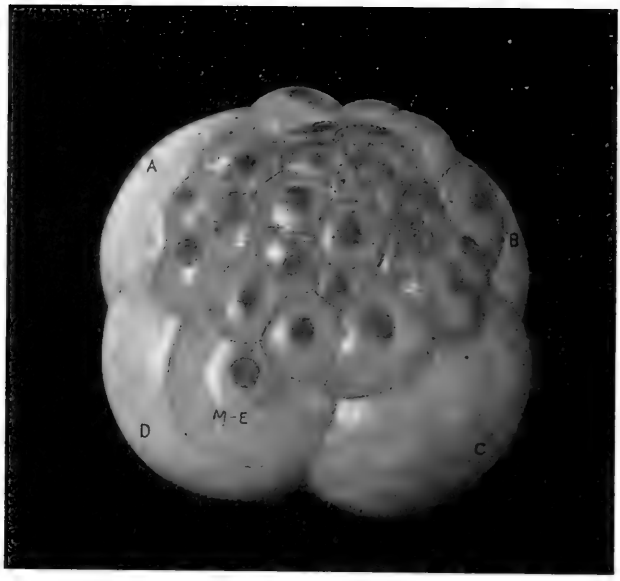
MODEL 12

Fifth cleavage completed. Sixth cleavage begun. Formation of third quartet of ectoblasts.



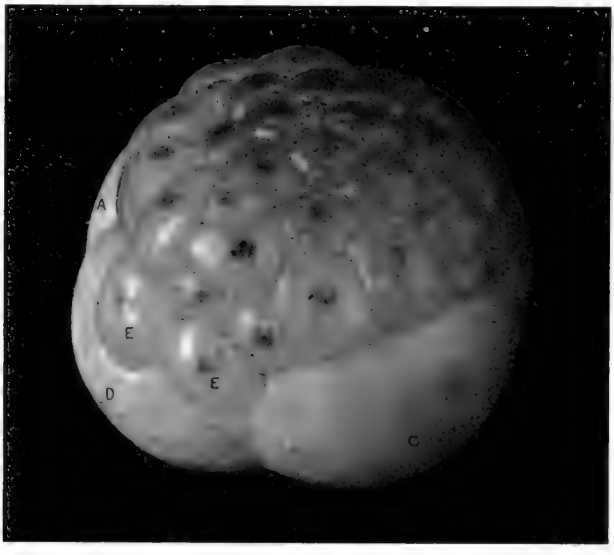
MODEL 13

Sixth cleavage completed. Second quartet has also divided; separation of ectoblasts completed.



MODEL 14

Separation from the left posterior large cell (D) of a single cell, the mesentoblast (M–E).



MODEL 15

Division of mesentoblast. The number of ectoblast cells has increased by further division of the three quartets.

The seventh cleavage (Model 12) divides the second quartet of ectoblasts.

The eighth cleavage (Model 13) consists of a second division of the first quartet of ectoblasts.

The ninth cleavage is unique, only one rather large cell, the "mesentoblast," M.-E. being separated off from the left posterior of the larger cells (D, Model 14). This new cell divides into two (Model 15) and again into four parts (Model 16). The upper two of these four cells, concealed on the model by the rim of the dorsal plate, multiply rapidly by division, and the cells which are formed from them make their way between the dorsal plate of the ectoblasts and the large yolk-laden cells below. They will form the future middle layer or mesoderm of the embryo, and

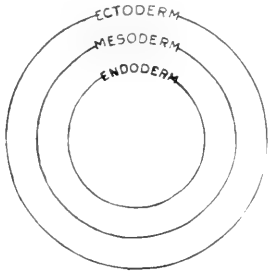


FIG. *d*

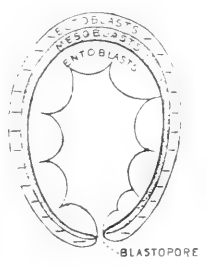
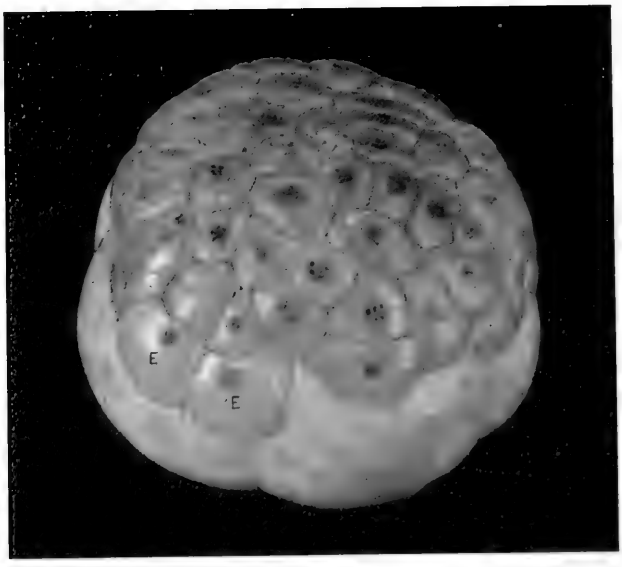


FIG. *e*

are known as the "mesoblasts." After the separation of the mesoblasts the remaining three large cells finally divide, giving in all eight or nine large inferior cells, the "entoblasts," which in time will form the inner layer of the embryo.

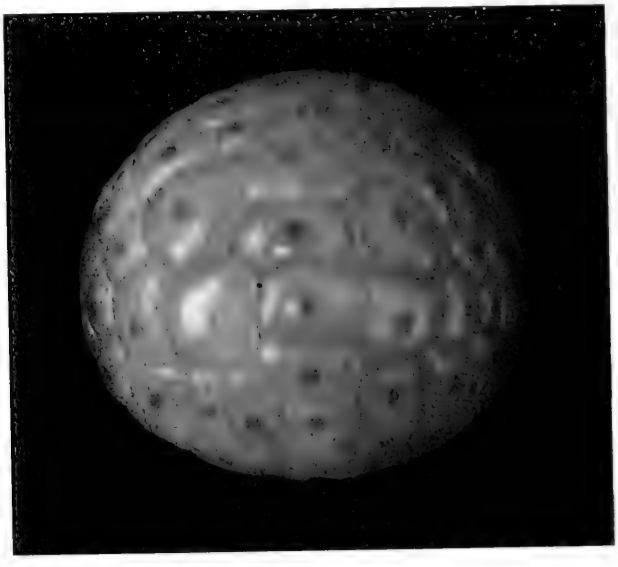
At an early stage there are thus separated in the egg the rudiments of the three layers distinguishable in the development of all higher animal organisms : ectoderm, mesoderm and entoderm. These may be diagrammatically represented as in Fig. *d*.

The ectoblasts by multiplication of cells soon extend over the entire ovum until only a narrow pore is left on the lower or ventral pole (Models 17, 18). Owing to the unequal rate of this growth, the upper or animal pole is at the same time shifted anteriorly till its angular distance from the lower vegetative pole becomes on this side only 90° (Model 18).



MODEL 16

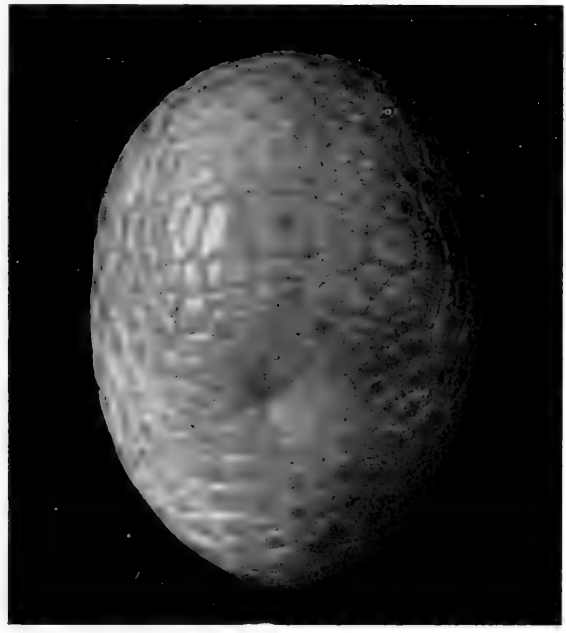
Second division of mesentoblast, resulting in the formation of two mesoblasts and two entoblasts, which are concealed under the rim of the plate of ectoblasts, further divisions of ectoblast cell.



MODEL 17

Continued spreading of ectoblasts over the surface of the egg. Their origin from the three quartets is indicated in the model by colors: first quartet, red; second, blue; third, uncolored.

Immediately around the pore left by the closing of the edge of the ectoblasts is seen on this model the depression which indicates the beginning of the future mouth of the embryo. For a short time the pore itself is closed, but soon opens again and communication is thus established between the exterior and the internal cavity of the embryo. The structure of the embryo at this time may be represented diagrammatically as in Fig. *e*.



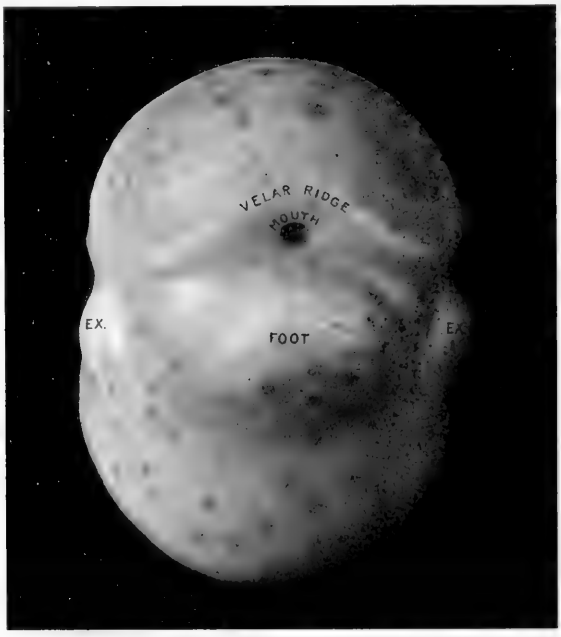
MODEL 18

The ectoblasts completely enclose the egg, leaving only a narrow pore (blastopore), about which is seen a depression. The derivation of ectoblasts from the three quartets indicated on the models by the coloring. The various regions of the future larva are becoming more sharply defined.

From this time on, the development consists of the differentiation by growth of the multiplying cells of these three separate layers into the specialized organs of the body.

The ectoderm cells which, as shown by the number of nuclei, are already very numerous, multiply rapidly in certain areas indicated by the slight outgrowths on the surface. These soon become more pronounced and form the beginning of the ectodermic organs of the embryo.

Above the mouth opening, which by this time is clearly defined, a ridge marks the beginning of the velum, or swimming organ, of the larva; below the mouth there is a large protuberance which will form the foot; at the sides of this two smaller knob-like outgrowths form the larval kidneys. At a point directly op-



MODEL 19

The larva begins to assume its definitive form. The mouth opening is formed; above it the curved edge of the velum is defined; below it the foot begins to protrude; on either side of this the first appearance of the larva kidney (EX) is indicated. At the lower pole of the model the shell gland is shown.

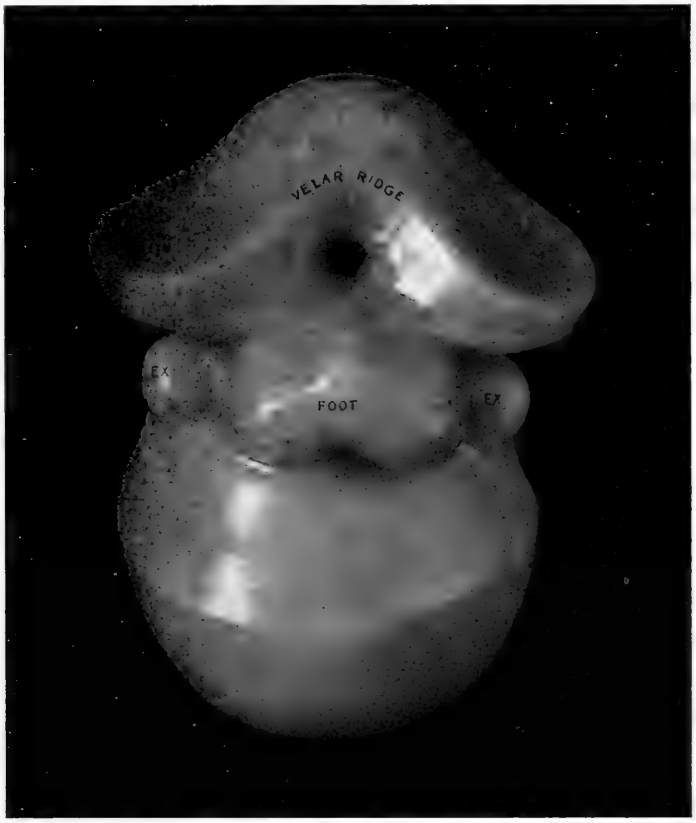
posite the apical, or head, end the shell gland develops (Model 18). Model 19 shows the shell beginning to be secreted by the shell gland.

The entoblast cells of the cavity of the gastrula by a process of unequal growth rapidly go to form the various parts of the digestive tube: stomach, liver, intestine etc. The œsophagus is formed by an invagination of the ectoderm from the exterior.

The middle layer, the mesoblastic layer, forms the muscles,

the circulatory system, heart and blood-vessels and the supporting tissues of the body.

Coincident with this differentiation of the regions of the body into organs, a change in the direction of the antero-posterior axis of the embryo takes place. The whole posterior portion is



MODEL 20

The formation of the veliger larva has proceeded farther. The various external organs are well defined. Below is seen the shell secreted by the underlying cells of the shell gland.

pushed ventrally: the mouth opening and the whole apical pole are shifted forward, and there is a twisting of the entire axis, plainly seen in the bending of the intestine. This organ, which originally lay in the mid-ventral line, assumes the form of an almost complete loop (Model 22). The asymmetry of the

mollusk larva is thus established and the definitive asymmetry of the adult is foreshadowed.

Models 21 and 22 show the completed larva, the free-swim-

MODEL 21. SIDE VIEW

The mollusk larva, or the veliger, completed. The velum, or swimming organ, about the anterior end bears two rows of cilia. The foot is large and prominent and bears on its under surface the lid, or operculum, by which the opening of the shell is closed when the animal withdraws into it. On the head are seen the two eyes. The two raised points near these mark the position of the feelers or tentacles.

ming veliger with its fully formed ciliated velum, or swimming organ, the shell and the large foot, bearing on its lower surface the operculum, or lid, by means of which the shell is closed when

the animal withdraws into it. On the head are seen the two eyes and near them the tentacles.

The veliger stage, though more or less suppressed in land mollusks, is common to all gastropods. By an additional series of changes, consisting in a continued growth and development in certain directions, this larva is ultimately metamorphosed into the adult form of its species.

MODEL 22

A section of the veliger showing the internal anatomy.

APPENDIX.

TECHNICAL DESCRIPTION OF THE MODELS.[1]

1. A. The ovum of *Crepidula* at the time of fertilization.

1. B. The fertilized ovum showing pronuclei lying in the cytoplasm at the animal pole. On either side of them the centrospheres. At the vegetative poles is seen the yolk-stalk. Jour. Morph., Vol. XIII, 1897, fig. 1.

2. First cleavage—appearance of first cleavage furrow. Jour. Morph., Vol. XIII, figs. 3, 4.

3. Completion of first cleavage furrow. Nuclei and asters opposite each other in the two blastomeres. Between the blastomeres are the polar bodies. Jour. Morph., Vol. XIII, fig. 5.

4. Resting stage after first cleavage. Flattening of blastomeres against each other. Dexiotropic turning of nuclei, asters and protoplasmic areas. Jour. Morph., Vol. XIII, fig. 7.

5. Beginning of second cleavage. Læotropic turning of spindles and protoplasmic areas. The centrospheres of preceding cleavage lie near the cleavage furrow. Jour. Morph., Vol. XIII, fig. 7.

6. Second cleavage. Beginning of second cleavage furrow. Læotropic rotation of spindles. Polar furrow being formed. Jour. Morph., Vol. XIII, fig. 9.

7. Completion of second cleavage. Asters nearly in position of poles of preceding spindles. Polar furrow well formed. Jour. Morph., Vol. XIII, fig. 10.

8. Third cleavage. Spindles almost radial, but showing slight dexiotropic rotation. Jour. Morph., Vol. XIII, fig. 12.

9. Third cleavage. Completion of first quartet. Position of asters shows that division was dexiotropic. Jour. Morph., Vol. XIII, fig. 13.

10. Fourth cleavage. Læotropic. First quartet has rotated into furrows between macromeres. Jour. Morph., Vol. XIII, fig. 14.

11. Fourth cleavage complete. Fifth cleavage, læotropic division of first quartet of micromeres and formation of "turret cells" (trochoblasts). Jour. Morph., Vol. XIII, fig. 16.

12. Fifth cleavage complete. Sixth cleavage dexiotropic. Formation of third and last quartet of ectomeres. Sixteen cells. Jour. Morph., Vol. XIII, fig. 17.

[1] The models correspond to the figures in "The Development of Crepidula," by Dr. E. G. Conklin, Jour. Morph., Vol. XIII, 1897, and "Karyokinesis and Cytokinesis," Jour. Acad. Nat. Sci., 2d Ser., Vol. XII, Phila., 1902.

13. Sixth cleavage complete. Division of second quartet complete. Quadrangular plate of ectomeres with angles of plate in furrows between macromeres. Twenty ectomeres (4 apical, 4 turret and 12 belt cells) and 4 macromeres. Jour. Morph., Vol. XIII, figs. 19, 20.

14. Formation of first member of fourth quartet, the mesentoblast, from the left posterior macromere; formation of basal cells of cross by the second division of first quartet. Jour. Morph., Vol. XIII, figs. 22, 23.

15. Division of the mesentoblast completed, dexiotropic. Second and third quartets. Turret cells formed. Forty-two cells: 4 apicals 8 cross, 4 turret, 20 belt cells, 2 mesentoblasts, 4 macromeres. Jour. Morph., Vol. XIII, fig. 29.

16. Fourth quartet completed by læotropic cleavage of macromeres, A, B and C. The two mesentoblasts of the preceding stage have divided, forming the two enteroblasts and two primary mesoblasts which lie immediately above the latter, but concealed by the plate of ectoblasts. Jour. Morph., Vol. XIII, fig. 31.

17. Further division of ectoblasts. Expansion of arms a, b and c of ectoblastic cross into a cell plate. Anterior shifting of apical cells. Posterior turret cells undivided. Formation of quadrangular blastopores, the enteroblasts in posterior angle. Jour. Morph., Vol. XIII, figs. 51, 52.

18. Later stage. Apex on ventral side, slightly to the right. Cells of ectoblastic cross, first quartet, cover the whole anterior end of embryo. Large cells of posterior arm, dorsal. The closing of the blastopore and a depression about it indicating the formation of the stomodæum. The superior rows of ectoblast cells of second quartet, directly above the blastopore, form the first and second velar rows. The shell gland is forming at the postero-dorsal and somewhat to the left. Jour. Morph., Vol. XIII, figs. 65, 74, 75.

19. Older embryo, showing apical, posterior and pedal cell plates. On either side to the anterior and posterior of the dorsal cell plate, the velar rows are branching. Mouth and the external kidneys are formed, the shell gland expanding. Jour. Morph., Vol. XIII, figs. 76 to 79.

20. Older stage-formation of velum and foot. The shell gland greatly expanded and forming the shell of the veliger. Jour. Morph., Vol. XIII, figs. 80–82.

21. The fully formed veliger.

22. Section of the preceding.

THE JESUP LOVING CUP

Anthropology–Forestry Panel

THE JESUP LOVING CUP

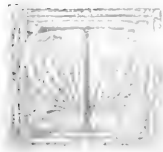
Anthropology–Forestry Panel

THE JESUP LOVING CUP

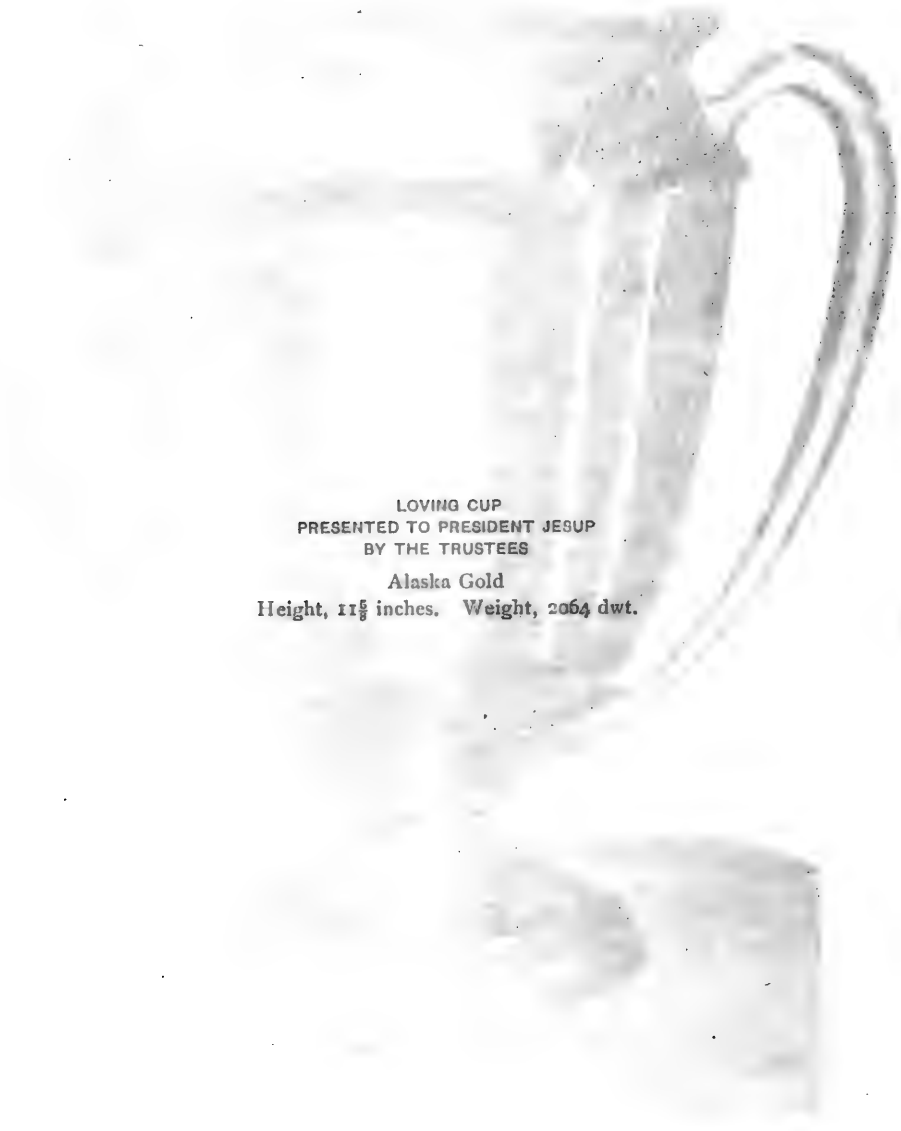
Zoölogy–Palæontology Panel

The American Museum

THE TWENTY-FIFTH ANNIVERSARY OF



LOVING CUP
BY THE TRUSTEES
Height, 11⅝ inches. Weight, 20oz. 4dwt.



LOVING CUP
PRESENTED TO PRESIDENT JESUP
BY THE TRUSTEES

Alaska Gold
Height, 11⅝ inches. Weight, 2064 dwt.

The American Museum Journal

VOL. VI. APRIL, 1906. NO. 2

THE TWENTY-FIFTH ANNIVERSARY OF THE PRESIDENCY OF MR. JESUP.

THE thirty-eighth annual meeting of the Board of Trustees of the Museum was held February 12, at the residence of Professor Osborn. The annual dinner followed the meeting, and at the close of the dinner after short addresses by Professor Osborn and Mr. J. Pierpont Morgan, Mr. Joseph H. Choate arose and on behalf of the Board of Trustees presented to President Jesup a gold loving cup bearing the following inscription:

1881 1906

FROM THE TRUSTEES
OF THE
AMERICAN MUSEUM OF NATURAL HISTORY
TO
MORRIS K. JESUP
ON THE
TWENTY-FIFTH ANNIVERSARY
OF HIS
PRESIDENCY OF THE MUSEUM
IN RECOGNITION OF HIS MOST ABLE
GENEROUS AND SUCCESSFUL
ADMINISTRATION
FEBRUARY 12th 1906

In his informal presentation speech, Mr. Choate referred to the critical period in the history of the Museum a quarter of a century ago when Mr. Jesup assumed the presidency, to the uninterrupted devotion which Mr. Jesup has shown to the highest interests of the Museum, to his generous gifts and to the rapid development of the Museum, which from a comparatively small beginning is now among the most important natural history museums of the world. Mr. Choate's address concluded with the presentation of the cup.

The cup is the work of Tiffany & Co., from designs indicating the principal branches of science which have been developed in the Museum and is commemorative particularly of the work in which Mr. Jesup has chiefly interested himself. The precious metal selected for the cup is gold from Alaska in reference to the President's interest in the North Pacific explorations. Around the base is a beautiful ornamental design taken from the work of the Amur River tribes, as shown in Volume VII of the Jesup North Pacific Reports. At the summits of the handles the gold relief work of pine leaves and pine cones and oak leaves and acorns is in reference to the collection of North American woods and forestry presented to the Museum by President Jesup.

The center of the cup is divided into four panels, the first of which contains the inscription above quoted. The second panel bears at the top the words GEOLOGY, GEOGRAPHY, beneath which is a design representing the cone of Mt. Pelé. The third panel bears at the top the words ANTHROPOLOGY, FORESTRY, and the design represents a Siberian native riding a reindeer with the words "North Pacific Expedition" beneath. The fourth panel is inscribed to ZOÖLOGY, PALÆONTOLOGY, with a design beneath composed of two of the fin-back Permian lizards, having under it the inscription "Cope Collection of Dinosaurs," in reference to the collection presented by Mr. Jesup.

Among the many changes marking the development of the Museum during the quarter of a century since Mr. Jesup was elected to the presidency the following may be mentioned as strikingly indicative of the feeling entertained by the President and heartily endorsed by the Board of Trustees that the museum which does not grow must cease to exist.

In 1881 there were only 54,500 sq. feet of floor space; now there are 570,158.

Then the building represented a cost of approximately half a million; now of approximately four millions of dollars.

In 1881 the city appropriated $10,000 for maintenance. It now appropriates $170,000.

Then there were twelve officers and employés; now there are one hundred and eighty-five.

The membership list has increased from approximately 800 to 2,000; the permanent endowment, from nothing to $1,013,000.

Before 1881 there were no publications, whereas the appropriation for publications alone for the current year is more than the entire appropriation of that year.

Before 1881 there were no public lectures. During the past year more than three hundred were delivered.

The meeting of the board was memorable, moreover, as bringing together for the first time in many years three of the original founders of the Museum, Messrs. Joseph H. Choate, J. Pierpont Morgan and Morris K. Jesup.

HENRY FAIRFIELD OSBORN.

JOHN H. WINSER.

FTER a brief illness with pneumonia complicated with heart trouble, Mr. John H. Winser, for many years secretary and assistant treasurer of the Museum, died Friday, January 12. At the annual meeting of the Board of Trustees the following resolutions were adopted:

"RESOLVED, That the Trustees desire to record their sense of loss in the death of MR. JOHN H. WINSER, for so many years the faithful Secretary and Assistant Treasurer of the Museum.

"Mr. Winser was appointed to his office in 1892, and for fourteen years served the Board of Trustees and the officers of the staff of the Museum with the greatest fidelity. He was invariably accurate in all his accounts and records, absolutely trustworthy in all matters of administration, devoted to the best interests of the Museum, giving its interests his very constant thought and attention, and extremely courteous and kindly in his manner. When acting under the direction of the President or other members of the Board he could always be depended upon faithfully to represent their wishes and instructions. During all the long years of his service he never failed to do his duty to the best of his ability. His genial and kindly presence will be greatly missed at the Museum.

"*Resolved*, That a copy of this resolution be sent to the surviving members of his family with an expression of warm sympathy."

THE SCIENTIFIC PUBLICATIONS OF THE JESUP NORTH PACIFIC EXPEDITION.

DURING the year 1905 several important parts of the scientific results of the Jesup North Pacific Expedition were published under the editorship of Professor Franz Boas, who has had the direction of all the work.

Volume III, Part 3. *Kwakiutl Texts.* By Franz Boas and George Hunt.

This number closes the volume containing the Kwakiutl texts recorded by Mr. George Hunt and revised and edited by Professor Boas. The volume is almost entirely devoted to traditions relating to the ceremonies and the families of this important group of Indians. These traditions, which are numerous, are remarkably uniform, and they explain the large collection of ceremonial objects collected for the Museum. The traditions resemble those of the coast tribes living farther north, and they account for family and tribal privileges. The style of the text is diffuse, but has been preserved because the stories contain many data relating to the every-day life of the tribe.

Volume V, Part 1. *Contributions to the Ethnology of the Haida.* By John R. Swanton.

Dr. Swanton's work among the Haida of the Queen Charlotte Islands was undertaken in co-operation with the United States Bureau of Ethnology with the understanding that the ethnological results were to be published by the Jesup North Pacific Expedition. The deities of the Haida are divided into two groups in the same way as the tribe themselves; those of the Raven and the Eagle. Regarding the tribal clans the interesting conclusion is reached that according to the ideas of the Haida the Raven clan is indigenous to the islands, while the Eagle clan may possibly be descendants of emigrants from the main land.

The principal crests of the families, which represent certain prerogatives, are for the Raven clan, the killer whale and grisly bear, for the Eagle clan, the eagle and the beaver. Some of the totem poles which are such a familiar sight to tourists in

the region bear the crest figures of the house owner and his wife, while others represent incidents in myths. Grave posts, canoes and household utensils bear similar representations, and crests are used by the people as designs in tattooing their bodies. The secret societies of the tribes are owned by various families and the more important were introduced from the south. The volume contains a number of interesting maps compiled by Dr. Charles F. Newcombe on which the native names of places and the locations of towns have been recorded.

Volume VI, Part 1. *The Koryak.* By Waldemar Jochelson.

The subjects treated in this volume are the religion and the mythology of one of the most important of the tribes living in extreme eastern Siberia. The principal Koryak deity is Big-Raven, who is looked upon as the founder of the world and the creator of its inhabitants. He is appealed to through prayers, sacrifices and incantations. The Koryak have besides a vague conception of a supreme being who sent Big-Raven to the earth to establish order. This supreme being does not seem to interfere in detail with the affairs of man, but as long as he looks down upon the earth there is abundance and health, whereas disorder reigns as soon as he turns away.

Malevolent spirits are very numerous, and there are supernatural beings which are rulers of various parts of the country. The Koryak, therefore, make extensive use of charms representing supernatural beings for protection against spirits. Sacrifices both bloody and bloodless are offered to the supernatural beings. The most important of these sacrifices are of reindeer and dogs, and Mr. Jochelson describes in detail the peculiar custom of attaching the bodies of dogs to poles or to the trees which represent the village guardians. Shamanism too plays an important part in the life of the Koryak. Professional shamans who treat the sick are employed in the tribe in addition to the particular family shamans.

Among the Maritime Koryak elaborate festivals are held relating to whale hunts, while among the Reindeer Koryak the most important ceremonials pertain to the herd of reindeer. The burial customs of the people are complex and include cremation.

The mythology of the tribe is remarkably uniform and deals

for the most part with the marriages of the children of Big-Raven and of his struggles with supernatural beings. The book closes with a detailed comparison of the Koryak mythology with the other mythologies of Siberia and with those of the Eskimo and the North American Indians, from which the author concludes that the interchange of mythological elements between the Indians and the Koryak must be older than that between the Koryak and the Eskimo.

Volume VII, Part 1. *The Chukchee.* By Waldemar Bogoras.

This book shows the intimate acquaintance which the author obtained through continuous studies made in the Kolyma district from 1889 to 1898 and later investigations carried on for the Jesup North Pacific Expedition at Anadyr and along the coast of the Chukchee Peninsula, eastern Siberia. The volume for the most part is devoted to the material culture of the people and the author concludes that in earlier times the Chukchee lived on the coast and that the present residence in the interior and the domestication of the reindeer are comparatively recent events. At the present time too the Chukchee are divided into two sections, the Maritime and the Reindeer groups. The method of harnessing reindeer is peculiar to the Chukchee, who use the animal mainly for hauling sledges. The present method of dog harnessing in pairs is that used by other Siberian tribes, whereas formerly all the dogs were attached to one point of the sledge, as is the present custom among the Eskimo.

The Chukchee hunt the seal and other sea mammals in a manner essentially the same as that used by the Eskimo. The means employed for capturing land animals are a combination of those employed by the Eskimo and by the tribes of western Siberia. The Chukchee employ sinewback bows and composite bows similar to those found farther south. The iron work of the tribe is extensive and shows the influence of the Yakut and the Amur River tribes. Armor made of small pieces of iron linked together and arranged in horizontal rows was formerly used by the Chukchee. The neck was protected by a large wooden ring incased in hide.

Detailed descriptions are given of the tents, the clay lamps and household utensils, the food and the manufactures. The

women, particularly those of the Maritime Chukchee, are tattooed and the designs are believed to have a magical significance. Many of the ornaments worn by the people are considered efficacious as charms. The Chukchee, furthermore, are fond of games and sports. The maps which accompany the book give the ancient and the present distribution of the tribes of northeastern Siberia. All the ethnological volumes of the expedition are profusely illustrated.

THE NEW METEORITE.

ONE of the most important announcements made at the annual meeting of the Board of Trustees was that through the generosity of Mrs. William E. Dodge the Museum had come into the possession of the great Willamette meteorite. This mass of iron, the weight of which is estimated at about sixteen tons, was found in the Willamette valley, near Oregon City, Oregon, in 1902. It is the largest meteorite which has been found in the United States, and is probably the most interesting mass of meteoric iron which has ever been discovered. A full description of the mass, which is the most valuable single specimen yet acquired by the Museum, having cost $20,600, is deferred to a later number of the JOURNAL.

GUIDE TO THE COLLECTION OF LOCAL BIRDS.

WE present in this number of the JOURNAL the first installment of an article by Mr. Frank M. Chapman upon the collection representing the birds which are to be found within a radius of about 50 miles of New York City, taking the Museum as a center. The completing installment of the article will be published with the July JOURNAL, and the whole article will be issued together in separate form as No. 22 of the Museum series of Guide Leaflets. The collection referred to may be found in the Hall of Local Birds, No. 303 of the third, or gallery, floor of the Museum building.

HINDOO SILVER WARE.

A LARGE and valuable collection of silver work from India has been presented to the Museum by Mr. J. G. Phelps-Stokes. There are in all forty-one pieces representing the best types of native work. The chief value of this collection to the Museum, however, is not in the technique of the objects, but with respect to their uses. Several types of the regalia of a dancing girl are represented. One pair of anklets bears a large number of bells with foot and toe pieces. There are also ear and neck ornaments in the form of crescents with similar bells attached. These dancers wear massive silver girdles with long circular clasps which are represented in the collection by a very handsome piece. There are two other pieces of particular interest, because they represent the conventional ornaments worn by girls before and after puberty. The one worn before puberty contains a girdle from the middle of which hangs a heart-shaped ornament, inlaid with bits of turquoise, while above extending upward and attached to the necklace is a broad band similar to the girdle. At the age of puberty this is discarded and a girdle of similar form, but with circular appendage takes its place, which is represented in the collection by a very handsome specimen consisting of a girdle with a double chain extending up over the shoulders around the neck and down the back to the girdle behind. These pieces come from the Central Provinces of India.

There are several objects of religious interest, two of which are shown in the illustration. One is a small shrine containing an image of the Buddha, wrapped in sacred cloth. Such a shrine is usually worn by priests, suspended from a neck chain or string of prayer beads; the other is an elaborate silver prayer wheel of Thibetan type and is probably one of the most valuable specimens in the whole series, since such objects cannot readily be secured, owing to their sacred character. There are several other religious objects, such as anklets worn by the priests, with a number of bangles attached indicating the rank of the wearer, and small vessels for holding and sprinkling sacred water over the worshipers. This collection is particularly valuable to the Museum for comparative study, because the anklets and foot

SHRINE OF BUDDHA

THIBETAN PRAYER WHEEL

Hindoo Silver

ornaments of the Hindoo dancing girls are distributed westward from oriental countries into North Africa and even into Europe. It is also probable that the elaborate leg-rings and other ornaments of the Central and South African natives are in some way connected with those of India. Silver work found its way also into the regions occupied by the uncivilized peoples of Siberia, specimens of which are well represented in the collections of the Jesup North Pacific Expedition. C. W.

THE JOHN COLLINS WARREN COLLECTION.

PRELIMINARY announcement may be made of a very important acquisition which has come to the Museum and especially to the Department of Vertebrate Palæontology through the generosity of Mr. J. Pierpont Morgan. It is that of the John Collins Warren Collection which for many years has been behind closed doors in the Warren Museum of Natural History in Boston. The collection is particularly valuable on account of the skeleton of the famous "Warren Mastodon" which it contains. This was dug out of a swamp near Newburg, N. Y., in the extremely dry summer of 1845. It was put together and exhibited about the country until 1847, when it was purchased by Professor Warren, who was then president of the Boston Society of Natural History, and who was one of the leading naturalists of his day.

The skeleton was practically complete when found, the only parts missing being a few of the vertebræ of the tail, and a few bones of the tips of the toes. It is in equally perfect condition to-day except the tusks, which were injured when the animal was taken out. Fortunately the extremities and portions of the bases of the tusks are still preserved. What is most striking in the skeleton, as Professor Thomas Dwight, grandson of Professor Warren, observes in a recent article, "is not only its great height, some twelve feet, but its great breadth." Besides this magnificent specimen, which is the most perfect and the best ever found, the Warren Collection includes the fine skull of another mastodon, known as the "Shawangunk Head," parts of a third

specimen known as the "Baltimore Mastodon," and series of upper and lower teeth which together with the above form the principal subject of Professor Warren's great memoir published in quarto form in Boston in 1855.

The collection also includes the backbone and portions of the skull of the whale-like animal *Zeuglodon* formerly known as *Hydrarchus*. Another important feature of the collection is a series of Connecticut valley footprints of Dinosaurs, many of the specimens being of rare perfection. The skeleton of the *Ornithorhynchus* in the collection was probably the only one in the country, when it was obtained. There are also casts of palæontological specimens, some of which are very difficult to procure at the present time.

DEPARTMENT OF MINERALOGY.

OME interesting additions to the Mineral Cabinet are worthy of notice, among which is a group of Olivine (Peridot) crystals from Egypt. The crystals show prisms, domes and pyramids with noticeable compression. This new source of Peridot has considerable interest. The Peridot gems of collections have largely come from the East, but their exact origin was unknown. Mr. Kunz has suggested that they must date back to the time of the Crusades, having been brought from the East, and from time to time found their way into commerce from churches and cloisters. The new locality is somewhere in Upper Egypt near the Red Sea, and was probably the source, or near the source, of the gems of the Levant. Some fine cut Peridots are to be seen in the Morgan Collection of Gems.

A specimen of the new and uncommon Chalmersite is among these additions. This mineral occurs in fluted orthorhombic crystals on dolomite, associated with pyrrhotite, chalcopyrite and siderite in the gold mine at Morro Velho in Minas Geraes, Brazil. The crystals are usually twinned, lustre metallic and color a bronze yellow.

Anapite from Anapa, Black Sea, in pale green plates is not altogether new to the collection, as a poorer but broader surface was previously secured, but the development of the plates is much more crowded and characteristic in the new specimen. The mineral is a hydrated phosphate of lime and iron.

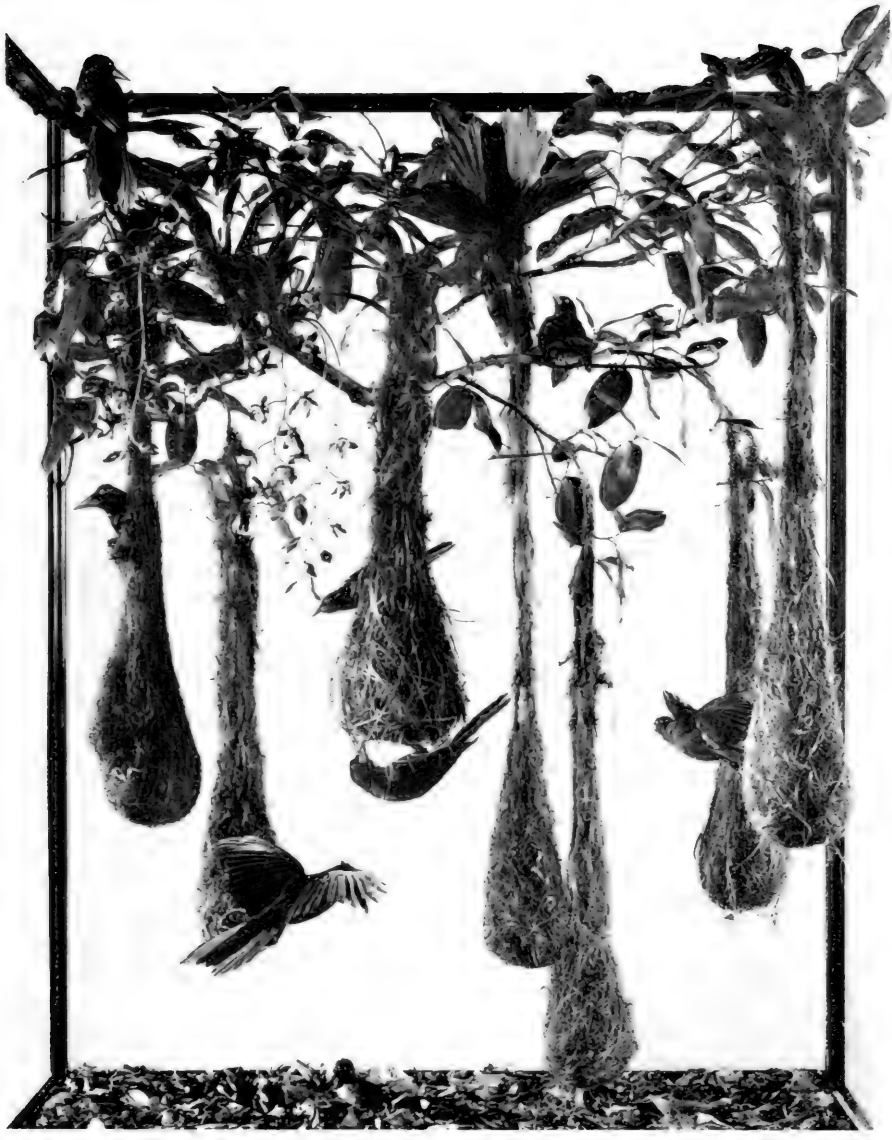
An elbow twin of Cassiterite like the familiar forms of Rutile from Parksburgh, Pa., is an interesting addition. This is from the classic locality of Morbihan, France, and though small is exceptionally perfect.

Two crystal fragments of Lapis Lazuli showing rhombic dodecahedral planes are valuable additions, since crystals of this mineral are phenomenally scarce. Teallite from Bolivia is another noteworthy addition to the cabinet. It is a new species, being the sulphostannate of lead. The exact locality is unknown though in all probability it comes from Poopó, where Franckeite and Cylindrite are found. It occurs in thin elastic flexible and cleavable laminæ. An elegant wire silver from Kongsberg, Norway, and a superb group of Stephanite crystals from Přibram, Hungary, Natrolite of relatively great size (for crystals), two unusual Beryls and an Indicolite Tourmaline, complete a small but valuable purchase, made with the assistance of the Bruce Fund.

L. P. G.

GROUP OF THE CRESTED CASSIQUE.

THE Crested Cassique, *Ostinops decumanus* (Pall.), which is also known by the names of Oropendula, Japu and Yellow-tail, is a tropical American relative of our Orioles, its nest, as the examples in the group show, being similar in plan to the smaller, bag-like structure of our Baltimore Oriole. The Cassique, however, not only builds a larger nest, but one hundred or more nests have been found suspended from the branches of a single tree. In spite of the comparatively small openings of the nests, the birds enter them in nearly full flight and when the presence of hungry young birds demands frequent visits by the parents, a colony



CRESTED-CASSIQUE GROUP
Hall No. 208

of Cassiques presents one of the most animated and attractive sights in the bird-life of our tropical forests. Following the rule that fewer eggs are laid by tropical than by northern birds, the Cassique lays but two eggs, while our Oriole lays four or five.

The Cassique possesses a great variety of loud calls and whistles, some of which are very musical. In the nesting season the male, which is noticeably larger than the female, has the singular habit of bending low his head while uttering a long-drawn creaking call, which he follows by flapping his wings violently together over his back. A bird in the upper part of the group is represented in this act.

The present species of Cassique is found throughout South America from southern Brazil northward to Panama, an allied species extending northward to Mexico.

Poised before the orchid (*Miltonia candida*) which appears in this group is a Hummingbird (*Florisuga mellivora*), while on the ground an Ant-Thrush (*Formicarius analis saturatus*) may be seen. The positions of the Cassiques, the Hummingbird and the Ant-Thrush in relation to their surroundings, illustrate the facts that brightly marked birds are, as a rule, found in the trees among leaves and blossoms, while the dull-colored species usually live on or near the ground.

The nests here shown were collected in Trinidad by Mr. A. B. Carr. The group was prepared at the Museum under the direction of Mr. J. D. Figgins and has been placed in the general collection of birds, Hall No. 208 of the second-floor, North Wing.

MUSEUM NEWS NOTES.

THE Library has received as a gift a copy of the catalogue of the Heber R. Bishop collection of jade. This unrivaled collection was presented by Mr. Heber R. Bishop during his life time to the Metropolitan Museum of Art where it has been installed in a room prepared for it at the expense of the donor. This catalogue is the most thorough investigation of the subject of jade and jade implements which has been undertaken, and it is considered to be the most magnificent example of the art of book-making which has been attempted in modern times. The

work consists of two folio volumes and is limited to an edition of 100 copies, none of which goes to a private individual, and none of which will be sold. These volumes measure 19 x 25 inches, are printed on the finest quality of linen paper, made expressly for the work and weigh respectively 69 and 55 pounds. They contain together 570 pages, 150 full-page illustrations and nearly 300 pen-and-ink sketches. This gift was made the subject of a special vote of thanks by the Trustees.

THE HON. SETH LOW, LL.D., has been elected to Patronship in the Museum.

THE Trustees have made the following changes in and additions to the membership of the Museum:

Mrs. Guy Ellis Baker was elected to succeed to the Patronship of her father, the late Gen. L. P. di Cesnola.

Mrs. F. A. Constable, to succeed to the Patronship held by her husband, the late Mr. F. A. Constable.

Mr. Adrian Iselin, Jr., to succeed to the Patronship of the late Mr. Adrian Iselin, who for many years was one of the Board of Trustees.

Mr. Adolph Lewisohn was elected a Patron, in recognition of his gift of Alaskan ethnological specimens.

Mr. George G. Heye was elected a Life Member, in recognition of his gift of Socorro pottery.

Mrs. Albert Bierstadt was elected a Life Member, in recognition of her gift of Indian of ethnological specimens.

THE following persons have subscribed to Life Membership in the Museum during the year 1905.

S. T. Armstrong, M.D.
Geo. McKesson Brown
Katharine L. Cammann
J. E. Childs
Henry A. C. de Rubio
W. B. Dickerman
J. W. Dimick
Edward K. Dunham
Thomas T. Eckert, Jr.
Amos F. Eno
Allen W. Evarts
Charles J. Harrah
George A. Kessler
Guy R. McLane
James A. Macdonald
Charles Duncan Miller
Charles E. Milmine
Abram G. Nesbitt
Acosta Nichols
Trenor L. Park
O. H. Payne
Seymour Perkins
Henry Phipps
George R. Sheldon
Jens Skougaard
Wm. S. Thomas, M.D.
Richard L. Walsh
Henry de Forest Weekes
James Dugald White
James Gilbert White
Wm. Ziegler[1]

[1] Deceased

THE list of Annual Members of the Museum was increased by the addition of 210 new names during the year 1905.

THE changes in installation in the large wall cases in the Morgan Gem Room have been completed. The cases have been lined with velours, and the handsomest specimens of Jade, Malachite, Azurite, Quartz, Calcite, Sulphur, Feldspar, Gypsum, Fluorite, Tourmaline and Rhodonite have been mounted in them. Each specimen has received independent treatment to bring out its salient characters in the best manner possible. Most visitors will be surprised at the wealth of beautiful material displayed, particularly in Malachite and Azurite, the green and blue copper ores for which the Copper Queen Mine of Arizona has long been famous, Calcite, or Calc-spar, and Quartz, including some remarkable masses of Amethyst.

MR. RICHARD TJADER, a traveler and hunter of wide experience, accompanied by Mr. Herbert Lang, one of the Museum preparators, left New York on March 1 on an expedition into British East Africa (Uganda) for birds and mammals, particularly the large mammals of the region, for the Museum collections. The party will land at Mombassa on the east coast and proceed thence by railroad to Nairobi. From Nairobi advance will be made by circuitous route northward, westward and southward to Port Victoria on Lake Victoria, whence return to the coast will be made by boat and rail. The expedition has been provided for through the generosity of Mr. Samuel Thorne.

MR. BRUCE HORSFALL, the bird artist, spent two weeks in Florida in January making sketches and notes for the Museum groups representing the Brown Pelican, the Water Turkey, the Great Blue Heron and the Sandhill Crane. The trip was highly satisfactory, and the results will shortly appear in the exhibition halls. This is a part of the work being carried on under the North American Ornithology fund to which the Museum owes the San Joaquin Valley group, the Flamingo group and several smaller groups.

THROUGH the generosity of a friend of the Museum, Professor H. E. Crampton of Barnard College, Columbia University, has been sent on an expedition to the South Sea Islands, particularly to study certain features of the fauna of the Tahiti group. The specimens collected by Professor Crampton are to become the property of the Museum.

MR. J. H. BATTY is in Mexico collecting birds and mammals for the Department of Mammalogy and Ornithology. He will make his way southward through Central America to South America before returning to the Museum.

MRS. ALBERT BIERSTADT has presented to the Department of Mammalogy an unusually large and fine mounted head of an American bison, which was taken by her husband many years ago while hunting on the Great Plains. The acquisition is particularly welcome on account of the practical extinction of the animal from its former extensive range. Mrs. Bierstadt has also given to the Department of Ethnology a valuable series of specimens consisting of baskets collected about fifty years ago, elaborately carved, wooden spoons from Alaska and large cedar chests with engraved and painted designs representing the Raven and the Killer Whale, together with specimens, such as beaded bags, drums, rattles and pipes, collected in early years from the Indians of the Plains.

THE Demuth collection of pipes and smoking utensils has been considerably extended in the past few months by the addition of a large series of specimens of ceremonial and other pipes from various tribes of North American Indians, and from the Ashanti, the Kaffir, the Makalolo, the Bali and other tribes of central and southern Africa. A series of Filipino pipes and cigars is an important further addition to this collection.

A LARGE group representing the Collared Peccary of Mexico has been installed in the Hall of North American Mammals, No. 206 of the second floor, and consists of a series of five of these pig-like creatures in their natural surroundings in southern Sinaloa, Mexico. The specimens and accessories were collected

near Escuinapa by Mr. J. H. Batty. The scene shows too the wonderful assemblage of thorny plants of several kinds characteristic of the hot semi-arid regions of our continent. The group was prepared at the Museum by Herbert Lang and Dr. B. E. Dahlgren.

A NEW group in the Siberian Hall, No. 101 of the ground floor of the building, represents some of the ceremonials of the Reindeer Chukchee, a large tribe inhabiting the extreme northeastern part of Siberia, preparatory to starting out upon the annual reindeer hunt which provides these people with food and raiment.

A SELECTION of some of the most striking material from the rich Museum collection from the South Sea Islands has been installed in the West Tower room opening off from the Siberian Hall. This is merely a suggestion of the extensive series which will be placed on exhibition when space has been provided.

ON February 24, Professor W. M. Wheeler, Curator of Invertebrate Zoölogy, went to Porto Rico to study some phases of the insect fauna of that island and make collections for the Museum in connection with a botanical expedition under Professor N. L. Britton, Director of the Botanical Garden in Bronx Park

THE series of models in the Department of Invertebrate Zoölogy continues to grow. Among the new models may be mentioned those representing several kinds of rotifers, bryozoans and other forms A series of eleven models shows the development of the starfish from the most rudimentary embryo to the end of the tenth day, when the larval form is about to pass from the creeping into the free swimming stage. The class of Brachiopoda is now represented by a series of selected forms mounted in alcohol or formaldehyde.

THE Department of Geology has received a ten-foot section of a drill core from a depth of 170–180 feet below the new building at 176 Broadway. The specimen, which is of garnetiferous mica schist, is the gift of the Standard Plunger Elevator Co.

An interesting and valuable collection of Termites and nests from the Isthmus of Panama has been donated to the Museum by Mrs. A. Beaumont of Vineland, New Jersey, as a memorial of her husband, the late Joseph Beaumont, Esquire, who collected the specimens. The collection contains several thousand queens, males, workers and soldiers of several species of Termites, preserved in alcohol and mounted in balsam on slides, together with specimens of nests, Termite tunnels and a number of other insects inhabiting Termite nests.

THE IGUANA GROUP
Hall No. 207

Among groups which have been placed temporarily in the East Mammal Hall, No. 207 of the second floor, may be mentioned those of the Iguana, the large tropical lizard which was collected for the Museum in Sinaloa, Mexico, the great Texas Rattlesnake, which next to the Diamond Back is the largest and most dangerous of the poisonous snakes in the United States, collected near the mouth of the Rio Grande and the Mud-Turtle,

representing a familiar inhabitant of the fresh-water marshes and ponds of the United States. Several snakes have been mounted and placed for the time being in the cases near by.

THERE has been added to the William Schaus collection a series consisting of 1500 specimens of Lepidoptera from Cuba collected by Mr. Schaus himself.

A PLASTER cast of the large Leatherback Turtle which was presented to the Museum last summer by Messrs. G. M. Long & Co. of New London, Conn., has been installed temporarily in the East Mammal Hall, No. 207 of the second floor of the Museum. The Leatherback is the largest of the Marine reptiles found in the vicinity of New York City.

THE Department of Anthropology has recently received from the Blackfoot Indians a medicine bundle used in the annual sun-dance. These bundles are rather difficult to obtain because of their sacred character and the restrictions governing their transfer from one individual to another. For these reasons they make an unusually important addition to a museum collection. The sun-dance is usually given at the expense of some woman who, in time of great trial, makes a vow to the sun that if her prayer is granted she will secure one of the sacred bundles and give or bear the expense of the sun-dance during the following summer. The bundle contains a head-dress upon which are symbols of the lizard, the First Woman and the sacred turnip, together with the feathers of a number of birds. In addition, the bundle contains a sacred digging stick with which the First Woman dug up the sacred turnip in violation of the commands of the Sun, the result of which was her fall. In the bundle there are also seven different kinds of paint used to anoint the body; seven large rattles representing the seven stars, and numerous other smaller objects used in the ceremony. There is an elaborate ritual pertaining to the bundle containing about one hundred songs referring to the power of the Sun and of the First Woman who dug up the forbidden turnip. This bundle and its contents will be installed in the exhibit of the Plains Indians.

THERE has been placed in the west stairway between the

second and third floors, a peculiar exhibit consisting of four "pictures" to demonstrate the fact that the colors of birds agree in tint with the colors of their surroundings. Three of the pictures represent the Bluejay, the Woodpecker and the Bird of Paradise in their natural surroundings and are intended to prove the theory that animals' colors, if they remain unchanged throughout the year, represent the scene which forms their background at the season and for the eyes with which their lives are most concerned. They are striking illustrations of protective coloration. The fourth picture is a landscape made entirely of the feathers of the Bluejay. The exhibit has been gotten together by Mr. A. H. Thayer of Monadnock, N. H.

AN attractive exhibit which has recently been placed on view in the Chinese Hall, No. 301 of the gallery floor, is the mahogany bed of a Chinese nobleman. The woodwork is elaborately inlaid with carved ivory representing landscapes and conventional figures and is ornamented with delicate carvings and paintings on silk. This combined bed and anteroom is designed to stand like one of our ordinary bedsteads in the sleeping room of the owner.

A NEW group in the North American Hall, No. 102 on the ground floor, represents the summer home of the Eskimo of Cumberland Sound. The scene selected is the bringing home of the results of a successful seal-hunting expedition. This group is a companion piece to the group of the winter home of the same tribe.

THE naturally mummified body from the copper mine in Chile, popularly known as the "Copper Lady," has attracted thousands of visitors to the Peruvian Hall during the past four months. The specimen was described and illustrated in the January number of the JOURNAL.

THERE were more than three hundred lectures and scientific papers given at the Museum during the year 1905. The attendance at these was as follows: Members' courses, 10,485; Pupils' courses, 46,399; on the principal holidays, 3,762; Board of Education courses, 42,212; meetings of scientific societies, 2,688.

THE records show that 17,402 visitors attended the American Tuberculosis Exhibition which was held at the Museum from November 27 to December 9, 1905.

THE attendance at the Museum in the year 1905 was 565,489 visitors, a highly satisfactory increase over the attendance in 1904. The receipts from membership fees too were larger during the past year than ever before, amounting to $17,875.00.

ON account of the enforced absence of Professor Bickmore through illness, the afternoon lecture to the general public on Washington's Birthday was given by Mr. George H. Sherwood, of the Scientific Staff, and the Members' lectures on March 15 and 22 were delivered by Professor Robert W. Prentiss, of Rutgers College.

THE Collection of Birds of Paradise provided for through the generosity of a friend of the Museum has recently received several choice acquisitions through purchase.

LECTURES.

MEMBERS' COURSE.

THE second course of lectures for the season 1905 and 1906 to Members of the American Museum of Natural History was given during February and March. Programme:

February 15.—MR. HARLAN I. SMITH, "The Five American Nations: Conquerors of the Snow, Forest, Mist, Desert and Plain."

March 1.—MR. FRANK M. CHAPMAN, "Impressions of English Bird-Life."

March 8.—MR. BARNUM BROWN, "Travels in Patagonia."

March 15.—PROF. R. W. PRENTISS, "Meteors and Comets: Their Mutual Relations."

March 22.—PROF. R. W. PRENTISS, "The Planets: Their Telescopic Appearance and Physical Condition."

PUPILS' COURSE.

THE programme of the second course of lectures to the public school children for the season 1905 and 1906 is as follows:

	Mar. Apr.	
Monday,	12,	2.—MR. G. H. SHERWOOD, "Japan and her Neighbors."
Wednesday,	14,	4.—MR. F. M. CHAPMAN, "Travels in the West Indies."
Friday,	16,	20.—MR. R. W. MINER, "Animals of North America—Their Habits and Uses."
Monday,	19,	23.—MR. G. H. PEPPER, "Life in California and the Great Southwest."
Wednesday,	21,	25.—DR. E. O HOVEY, "The Region of the Great Lakes."
Friday,	23,	27.—MR. G. H. SHERWOOD, "American Trees and their Products."
Monday,	26,	30.—Mr. H. I. SMITH, " Hiawatha's People."
	May	
Wednesday,	28,	2.—MR. G. H. SHERWOOD, "Historical Scenes in the Colonies."
Friday,	30,	4.—Mr. R. W. MINER, "Mediterranean Countries, Ancient and Modern."

Particulars regarding this course may be obtained by addressing the Director.

PEOPLE'S COURSE.

THE programme of the second course of Free Lectures to the People, which are given on Tuesday and Saturday evenings in co-operation with the Department of Education of the City of New York, is as follows:

Saturday evenings at 8 o'clock.

A course of nine lectures on Physics, illustrated by stereopticon views and experiments.

PROF. ERNEST R. VAN NARDROFF.

March 3.—"The Nature of Light and Color."
March 10.—"Spectrum Analysis and the Stars."
March 17.—"Color Photography."
March 24.—"The Optics of Painting."
March 31.—"The Colors of Polarized Light."
April 7.—"Colors from the Interference of Light."
April 14.—"The Relation of Light to Electricity."

April 21.—"Optical Illusions."

April 28.—Dr. Charles H. Tyndall, "Wireless Telegraphy."

Tuesday evenings at 8 o'clock.

March 6.—Mr. Oscar Phelps Austin, "A Tour of the World's Markets and Market Places."

March 13.—Mr. B. Bulkley, "The Yellowstone National Park."

March 20.—Prof. Herschel C. Parker, "First Ascents and Explorations in the Canadian Alps."

March 27.—Mr. A. H. Fish, "The Land of Lewis and Clark."

April 3.—Dr. C. F. Walker, "The Lake Superior Copper Country."

April 10.—Mr. James Arthur MacKnight, "The South To-day."

April 17.—Mr. William T. Dorward, "The City of Washington."

April 24.—Messrs. Albert Ulmann, R. P. Bolton, and Edward Hagaman Hall, "Historic Landmarks of New York City."

LINNÆAN SOCIETY COURSE.

In co-operation with the New York Linnæan Society a course of lectures was delivered on Wednesday evenings according to the following programme:

February 21.—Dr. Alfred G. Mayer, "Tortugas Marine Laboratory of the Carnegie Institution—its Aims and Problems."

March 7.—Mr. Edgar F. Stead, "New Zealand Bird-Life."

March 14.—Dr. Robert T. Morris, "A Naturalist's Camping Trip to Hudson Bay."

March 21.—Mr. G. Abbott, "Bird-Hunting with a Camera."

MEETINGS OF SOCIETIES.

The New York Academy of Sciences holds its regular meetings at 8:15 P.M. at the Museum in the following order:

First Mondays.—Business meeting and Section of Biology.

Second Mondays.—Section of Geology and Mineralogy.

Third Mondays.—Section of Astronomy, Physics and Chemistry.

Fourth Mondays.—Section of Anthropology and Psychology.

The Linnæan Society, the New York Entomological Society and the Torrey Botanical Club hold meetings upon Tuesday evenings, and the New York Mineralogical Club upon Wednesday evenings as announced.

The meetings of all the societies are open free to the public and visitors are made welcome.

THE LABRADOR DUCK
Group, Hall No. 208

THE BIRDS OF THE VICINITY OF NEW YORK CITY.[1]

By Frank M. Chapman.

Associate Curator of Mammalogy and Ornithology.

Introduction.

The collection which this Guide is intended to accompany has been formed especially to aid students in identifying the birds found in the vicinity of New York City. It occupies a portion of the West Corridor of the third floor (Hall No. 303). With a few exceptions, all the specimens contained in it were collected within 50 miles of the American Museum of Natural History. The species which we have as yet been unable to secure within these limits are represented temporarily by specimens from the North American Collection. The collection is placed under two heads: first, systematic, containing virtually all the birds which have been recorded from within the prescribed limits, and second, seasonal, in which only the birds of the month are exhibited, as is explained more fully beyond. Species of accidental occurrence, or those which have been found in this vicinity but once or twice, are grouped at the end of the systematic collection.

The birds are labeled in accordance with the system of nomenclature adopted by the American Ornithologists' Union. The number on the label, preceding the name of each species is its number in the Union's "Check-List" of North American birds (2nd edition, 1895). In the desk case in the center of the hall will be found a local collection of the nests and eggs of the birds which breed within 50 miles of the Museum. It is labeled on the same plan as the local collection of birds. Near by are placed photographs from nature of the nests of most of our breeding birds and exhibits of bills, feet, wings, tails and feathers designed to explain technical terms used in descriptive ornithology. A list of useful ornithological publications will also be found here.

[1] Issued also in separate form as **Guide Leaflet** no 22.

The appended annotated list of the species known to occur within a radius of 50 miles of the Museum is based on information derived for the most part from four sources: (1) previously published records; (2) the author's notes covering a period of twenty years' intermittent observation, mainly at Englewood, N. J.; (3) the observations of Mr. Waldron DeWitt Miller at Plainfield, N. J.; and (4) information received from Mr. William Dutcher. For many years Mr. Dutcher has made a specialty of the study of Long Island birds and has brought together a vast amount of data concerning them.

As a matter of local interest an asterisk (*) has been placed before those species which have been observed in Central Park. This list of Park birds is based on published records, the author's observations and information received from Messrs. C. G. Abbott, S. H. Chubb and B. S. Bowdish.

The text cuts with which this Guide is illustrated, with the exception of the Starling, are from Coues's "Key to North American Birds." For their use the Museum is indebted to Messrs. Dana Estes and Company, the publishers of that work. The full page plates are from photographs of Museum exhibits.

The region embraced within our limits possesses natural advantages calculated to attract a great number of birds. Our seacoast, with its sandy beaches and shallow bays; our rivers, creeks and ponds, with their surrounding grassy marshes; our wooded hillsides and valleys; our rolling uplands and fertile meadows, offer haunts suited to the wants of most birds. Again, our coastline and the Hudson River valley form natural highways of migration regularly followed by birds in their journeys to and from their summer homes.

The exceptional abundance of birds in this vicinity, however, is not due alone to the varied character of the country, or to the fact that twice each year streams of migrants pass along our coasts and through our valleys. There are certain causes which tend to limit the ranges of animals, chief among which is temperature. A study of the ranges or habitats of animals and plants shows that the boundaries of the areas inhabited by many species coincide with one another and also to a greater or less extent with lines of equal temperature. The ranges of these species being thus governed by natural causes, they are taken as indices of the limits of faunas or natural life-areas. The

lines between these faunas cannot, of course, be sharply drawn. The change from one to another is gradual, and between the two a neutral strip exists in which will be found species characteristic of each. Just such a condition is found in this vicinity, the northern boundary of the Carolinian Fauna over-lapping the southern boundary of the Alleghanian Fauna in the valleys of the Delaware, Hudson and Connecticut. In other words, we have here on the one hand a number of birds which are found no farther north and on the other certain species which are found no farther south; that is, in the breeding season, for among birds only the nesting ranges are of value in determining the boundaries of faunas.

The southern limit of the Carolinian Fauna on the Atlantic Coast is near Norfolk, Virginia; its northern limit, on the coast, as said above, is in the vicinity of New York City. To be more exact, a careful study of the nesting ranges of certain species shows that the most northern points at which they are regularly found is Port Jervis in the Delaware valley, Fishkill in the Hudson River valley, and Portland in the Connecticut River valley. These localities then may be considered as defining the northern limits of the Carolinian Fauna in the valleys in which they are placed. In the more elevated country between these points it is doubtful if the limits of the fauna reach quite as far north, for river valleys, both because they offer a natural pathway for the extension of a bird's range, and because of the higher temperature prevailing in them, tend to carry northward the boundaries of faunas. Eastward, along the Connecticut shore, the Carolinian Fauna may reach the mouth of the Thames. Long Island, although farther south, belongs for the most part in the Alleghanian rather than the Carolinian Fauna. Numbers of species common and even abundant in the Lower Hudson valley are exceedingly rare on Long Island, especially on the southern shore. But along the northern shore, or older part of the island, where deciduous trees abound, there is an evident trace of the Carolinian Fauna shown by the regular occurrence of the Blue-winged Warbler and the Acadian Flycatcher.

The following Carolinian birds are found every summer within 50 miles of the Museum, and all but two or three are known to nest regularly here. Their occurrence as breeding birds northward beyond these limits is, with but few exceptions, rare and irregular.

Clapper Rail.
King Rail.
Turkey Vulture.
Barn Owl.
Acadian Flycatcher.
Fish Crow.
Cardinal.
Rough-winged Swallow.
Worm-eating Warbler.
Blue-winged Warbler.
Louisiana Water-Thrush.
Kentucky Warbler.
Hooded Warbler.
Mockingbird.
Carolina Wren.
Tufted Titmouse.
Carolina Chickadee.
Blue-gray Gnatcatcher.

The southern limit of the Alleghanian Fauna on the coast is less clearly defined. It includes, however, Long Island and northern New Jersey. Its boundaries may be determined by the presence in the breeding season of the following species, few of which are known to nest at sea-level south of our limits:

Carolina Rail.
Alder Flycatcher.
Least Flycatcher.
Bobolink.
Savanna Sparrow.
Rose-breasted Grosbeak.
Purple Finch.
Golden-winged Warbler.
Nashville Warbler.
Chestnut-sided Warbler.
Black-throated Green Warbler.
Wilson's Thrush.

Thus it will be seen that while the region south of our district has the Carolinian species mentioned, and the region to the northward has the Alleghanian species just given, we, in this intermediate strip, have both Carolinian and Alleghanian species.

It is evident, therefore, that from an ornithological standpoint we are most favorably situated, and a comparison of the number of birds found within our limits with the numbers recorded from other districts shows that the causes mentioned have been effective in giving us an unusually rich avifauna. Due allowance must of course be made for the much greater area included in all but one of the regions used in comparison.

Recorded from within 50 Miles of New York City	. . .	353
" " District Columbia (Richmond, MS.)	. . .	281
" " Ontario, Canada, (McIlwraith)	. . .	316
" " Massachusetts (Howe and Allen)	. . .	362
" " Illinois (Ridgway)	. . .	352
" " Indiana (Butler)	. . .	305
" " Michigan (Cook)	. . .	332
" " Kansas (Goss)	. . .	343

During the course of a year the bird-life of our vicinity is subject to great changes. Some birds are always with us, some come for the summer, others pass us in the spring and fall in traveling to and from their more northern homes, and others still come

only in the winter. Our birds may thus be arranged, according to the season when they are present, in several rather well-defined groups, for which the following names seem most applicable.

I. Permanent Residents.—This class includes species which are with us throughout the year, but it does not follow that the same individuals pass the entire year here. Comparatively few, indeed, of the species in this group are permanent residents in the strict sense of the term. The Bob-white, Ruffed Grouse, and several of the Owls are doubtless literally permanent residents, that is, the same individuals pass their lives in one restricted locality, but it is not probable that the Bluebirds, for example, found here during the winter are the same birds which nested with us in the summer. Doubtless our winter Bluebirds pass the summer farther north, while our summer Bluebirds winter farther south but as a species, the Bluebird is a permanent resident.

List of Permanent Residents.

Bob-white.
Ruffed Grouse.
Marsh Hawk.
Sharp-shinned Hawk.
Cooper's Hawk.
Red-tailed Hawk.
Red-shouldered Hawk.
Broad-winged Hawk.
Bald Eagle.
Duck Hawk.
Sparrow Hawk.
Long-eared Owl.
Barred Owl.
Screech Owl.
Great Horned Owl.
Hairy Woodpecker.
Downy Woodpecker.
Flicker.
Blue Jay.
American Crow.
Fish Crow.
Starling.
Meadowlark.
House Sparrow.
Purple Finch.
American Goldfinch.
European Goldfinch.
Song Sparrow.
Swamp Sparrow.
Cardinal.
Cedar Waxwing.
Carolina Wren.
White-breasted Nuthatch.
Tufted Titmouse.
Chickadee.
Robin.
Bluebird.

II. Summer Residents.—Summer residents, as the name implies, are birds found here during the summer. They may, however, arrive early in March and remain until December, as do the Blackbirds and the Woodcocks, or they may not come until May and may leave us in August. Summer residents, then, are birds which come to us at varying times in the spring and after nesting here return to more southern winter resorts in the fall.

List of Summer Residents.

Wood Duck.
American Bittern.
Least Bittern.
Green Heron.
Black-crowned Night Heron.
King Rail.
Clapper Rail.
Virginia Rail.
Sora.
Yellow Rail.
Black Rail.
Woodcock.
Bartramian Sandpiper.
Spotted Sandpiper.
Killdeer.
Piping Plover.
Mourning Dove.
Osprey.
Barn Owl.
Yellow-billed Cuckoo.
Black-billed Cuckoo.
Belted Kingfisher.
Red-headed Woodpecker.
Whip-poor-will.
Nighthawk.
Chimney Swift.
Ruby-throated Hummingbird.
Kingbird.
Crested Flycatcher.
Phœbe.
Wood Pewee.
Acadian Flycatcher.
Alder Flycatcher.
Least Flycatcher.
Bobolink.
Cowbird.
Red-winged Blackbird.
Orchard Oriole.
Baltimore Oriole.
Purple Grackle.
Vesper Sparrow.
Savanna Sparrow.
Grasshopper Sparrow.
Henslow's Sparrow.
Sharp-tailed Sparrow.
Seaside Sparrow.
Chipping Sparrow.
Field Sparrow.
Towhee.
Rose-breasted Grosbeak.
Indigo Bunting.
Scarlet Tanager.
Purple Martin.
Cliff Swallow.
Barn Swallow.
Tree Swallow.
Bank Swallow.
Rough-winged Swallow.
Red-eyed Vireo.
Warbling Vireo.
Yellow-throated Vireo.
White-eyed Vireo.
Black and White Warbler.
Worm-eating Warbler.
Blue-winged Warbler.
Golden-winged Warbler.
Parula Warbler.
Yellow Warbler.
Chestnut-sided Warbler.
Black-throated green Warbler.
Pine Warbler.
Prairie Warbler.
Ovenbird.
Louisiana Water-Thrush.
Kentucky Warbler.
Maryland Yellow-throat.
Yellow-breasted Chat.
Hooded Warbler.
Redstart.
Catbird.
Brown Thrasher.
House Wren.
Short-billed Marsh Wren.
Long-billed Marsh Wren.
Wood Thrush.
Wilson's Thrush.

III. Summer Visitants.—Comparatively few birds fall into this group. As a rule the northern limit of their breeding range is not far south of our southern boundaries and they sometimes

visit us in small numbers, generally after their breeding season is over. In this group may also be placed the Shearwaters and Petrels, some of which are known to nest in the Antarctic Regions during our winter. In the spring they migrate northward and pass the summer off our coasts.

List of Summer Visitants.

Gull-billed Tern.
Royal Tern.
Forster's Tern.
Sooty Tern.
Black Skimmer.
Greater Shearwater.
Audubon's Shearwater.
Sooty Shearwater.
Wilson's Petrel.
American Egret.
Little Blue Heron.
Wilson's Plover.
Oyster-catcher.
Turkey Vulture.
Red-bellied Woodpecker.
Summer Tanager.
Carolina Chickadee.
Blue-gray Gnatcatcher.
Mockingbird.

IV. Winter Residents.—Winter residents, like summer residents, may arrive long before and remain long after the season which gives them their name. Our Junco, or Snowbird, for example, comes from the north in September and remains until April, but is a typical winter resident. That is, it arrives in the fall and after passing the entire winter with us returns to its more northern summer home in the spring.

List of Winter Residents.

Holbœll's Grebe.
Horned Grebe.
Loon.
Red-throated Loon.
Razor-billed Auk.
Kittiwake Gull.
Glaucous Gull.
Great Black-backed Gull.
Herring Gull.
Ring-billed Gull.
Green-winged Teal.
American Golden-eye.
Buffle-head.
Old-Squaw.
King Eider.
American Scoter.
White-winged Scoter.
Surf Scoter.
Purple Sandpiper.
Rough-legged Hawk.
Saw-whet Owl.
Horned Lark.
Prairie Horned Lark.
American Crossbill.
Redpoll.
Pine Siskin.
Snowflake.
Lapland Longspur.
Ipswich Sparrow.
White-throated Sparrow.
Tree Sparrow.
Junco.
Northern Shrike.
Myrtle Warbler.
Winter Wren.
Brown Creeper.
Canadian Nuthatch.
Golden-crowned Kinglet.

V. Winter Visitants.—Winter visitants are birds which may or may not visit us during the winter. As a rule, their presence

depends upon the severity of the winter. An unusually severe season sometimes forces boreal birds southward and they then may be found in numbers south of their regular winter range.

List of Winter Visitants.

Puffin.
Black Guillemot.
Brunnich's Murre.
Dovekie.
Iceland Gull.
Kumlien's Gull.
Cormorant.
Harlequin Duck.
American Eider.
Goshawk.
Black Gyrfalcon. (?)
Hawk Owl.
Snowy Owl.
Evening Grosbeak.
Pine Grosbeak.
White-winged Crossbill.
Holbœll's Redpoll.

VI. Regular Transient Visitants.—The birds of this class are found here only during the migrations. Their summer homes are north of us, their winter homes are south of us, and we see them only when they pass northward on their spring migration and southward on their fall migration.

List of Regular Transient Visitants.

Pied-billed Grebe.
Pomarine Jaeger.
Parasitic Jaeger.
Long-tailed Jaeger.
Laughing Gull.
Bonaparte's Gull.
Common Tern.
Roseate Tern.
Caspian Tern.
Cory's Shearwater.
Leach's Petrel.
Gannet.
Double-crested Cormorant.
Red-breasted Merganser.
Hooded Merganser.
Black Duck.
Blue-winged Teal.
Pintail.
Redhead.
American Scaup Duck.
Lesser Scaup Duck.
Ruddy Duck.
Canada Goose.
Brant.
Great Blue Heron.
Florida Gallinule.
Coot.
Red Phalarope.
Tennessee Warbler.
Cape May Warbler.
Black-throated Blue Warbler.
Dowitcher.
Long-billed Dowitcher.
Stilt Sandpiper.
Knot.
Pectoral Sandpiper.
White-rumped Sandpiper.
Least Sandpiper.
Red-backed Sandpiper.
Semipalmated Sandpiper.
Western Sandpiper.
Sanderling.
Greater Yellow-legs.
Yellow-legs.
Solitary Sandpiper.
Willet.
Hudsonian Curlew.
Black-bellied Plover.
Golden Plover.
Semipalmated Plover.
Turnstone.
Pigeon Hawk.
Short-eared Owl.
Yellow-bellied Woodpecker.
Magnolia Warbler.
Bay-breasted Warbler.

Northern Phalarope.
Wilson's Snipe.
Olive-sided Flycatcher.
Yellow-bellied Flycatcher.
Rusty Blackbird.
Bronzed Grackle.
Nelson's Sharp-tailed Sparrow.
Acadian Sharp-tailed Sparrow.
White-crowned Sparrow.
Lincoln's Sparrow.
Fox Sparrow.
Philadelphia Vireo.
Blue-headed Vireo.
Nashville Warbler.
Black-poll Warbler.
Blackburnian Warbler.
Palm Warbler.
Yellow Palm Warbler.
Water-Thrush.
Connecticut Warbler.
Mourning Warbler.
Wilson's Warbler.
Canadian Warbler.
Titlark.
Ruby-crowned Kinglet.
Gray-cheeked Thrush.
Bicknell's Thrush.
Swainson's Thrush.
Hermit Thrush.

VII. Irregular Transient Visitants.—These birds occur irregularly during the migrations. With certain exceptions they are birds of the interior and breed in the northern United States and British Provinces. Their regular line of migration is down the Mississippi Valley, and their occurrence on the Atlantic coast is more or less infrequent. Here are also included species formerly common near New York, but now practically extinct within our limits, where, however, they are sometimes found.

List of Irregular Transient Visitants.

Least Tern.
Black Tern.
Mallard.
Gadwall.
American Widgeon.
Shoveller.
Canvasback.
Ring-necked Duck.
Greater Snow Goose.
Blue Goose.
American White-fronted Goose.
Hutchins's Goose.
Black Brant.
Whistling Swan.
Wilson's Phalarope.
American Avocet.
Baird's Sandpiper.
Marbled Godwit.
Hudsonian Godwit.
Buff-breasted Sandpiper.
Long-billed Curlew.
Eskimo Curlew.
Passenger Pigeon.
Golden Eagle.
Migrant Shrike.
Orange-crowned Warbler.
Grinnell's Water-Thrush.

VIII. Accidental Visitants.—The homes of the birds included in this class are so far removed from our boundaries that their presence here at any time can be considered only as purely accidental. In most cases it is doubtless due to the agency of storms or high winds which drive migrating birds from their course. One-fourth the number given below are Old World birds, and about one-half the total number have been found here but once.

List of Accidental Visitants.

Black-throated Loon.
Ivory Gull.
Little Gull.
Sabine's Gull.
Fulmar.
Booby.
White Pelican.
Brown Pelican.
European Widgeon.
European Green-winged Teal.
Rufous-crested Duck.
Barnacle Goose.
White Ibis.
Glossy Ibis.
Snowy Heron.
Yellow-crowned Night Heron.
Corn Crake.
Purple Gallinule.
Black-necked Stilt.
European Woodcock.
Curlew Sandpiper.
Ruff.
Lapwing.
Ground Dove.
Black Vulture.
Swallow-tailed Kite.
Swainson's Hawk.
White Gyrfalcon.
Great Gray Owl.
Red-cockaded Woodpecker.
Pileated Woodpecker.
Arkansas Kingbird.
Raven.
Chestnut-collared Longspur.
Lark Sparrow.
Blue Grosbeak.
Painted Bunting.
Dickcissel.
Louisiana Tanager.
Bohemian Waxwing.
Prothonotary Warbler.
Cerulean Warbler.
Yellow-throated Warbler.
Townsend's Solitaire.
Varied Thrush.
Wheatear.

Summary.

Permanent Residents	34
Summer Residents	86
Summer Visitants	19
Winter Residents	38
Winter Visitants	17
Regular Transient Visitants	86
Irregular Transient Visitants	27
Accidental Visitants	46
Total,	353

THE SEASONAL COLLECTION.

The preceding seasonal analysis of our avifauna shows that only a part of the 353 birds which have been recorded from this vicinity are present at one time, and any arrangement of specimens which will, for example, show only the birds of a given month, will of course greatly simplify the problem of identification by excluding from it all species which, for seasonal reasons, we should not expect to find during the month in question.

The Seasonal Collection is made up of the Permanent Residents (Cases Q and O) and Migrants (Case P) and is changed

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BLACK DUCK
Group, Hall No. 208

each month. Thus, in February, it is composed of the ever-present Permanent Residents together with the migrants which have come from the north to spend the winter. In March, the March migrants from the south are added, and a month later those which may be expected to arrive in April are included. In due time the winter birds are withdrawn and the transient migrants removed, until in June, the collection consists of the Permanent Residents and birds which have come from the south to spend the summer. A similar treatment is continued throughout the year and the collection always, therefore, represents the bird-life of the month in which it is seen.

The following outline of the bird-life of the year explains more fully the manner in which this Seasonal Collection is arranged, and at the same time, it may be used as a reference check-list in the study of local migration. It should be understood that the dates given represent those of a climatically normal year and that only the commoner water birds are included.

January Bird-Life.—Probably during no other month is there less movement among our birds than in January. The regular winter visitants have come; the fall migrants which may have lingered until December have gone, and the earliest spring migrants will not arrive before the latter part of February or in early March. In fact, January is the only month in the year in which, as a rule, some birds do not arrive or depart. This rule, however, may be broken by such irregular birds as the Pine Grosbeak and the Redpoll, and, south of New York, the Snowflake and the Crossbill, birds which may be wholly absent some winters and abundant others.

The only birds usually to be found in January, therefore, are the permanent residents and the regular winter visitants. Singing, mating, nesting, molting, migrating, events which in their season play so important a part in a bird's life, do not concern the birds of January. With them food is the one important question, and their movements at this season are governed solely by the food supply. Snow may fall and winds blow, but as long as the birds find enough to eat they give small heed to the weather. Food, therefore, rather than temperature, is the most important factor in a bird's life at this season.

BIRDS OF THE MONTH.

Permanent Residents, see page 85.
Winter Residents, see page 87.

February Bird-Life.—The conditions prevailing in the bird

world during January will be practically unchanged until the latter part of February. Then, should there be a period of mild weather, we may expect to hear the Song Sparrows and Bluebirds inaugurate the season of song. An unusually warm day earlier in the month may have tempted either or both of these birds prematurely to welcome spring, but as a rule we do not hear them until late in February, and then only under favorable conditions.

The songs of these birds bid us keep watch for the earlier migrants, the Robin, the Purple Grackle and the Red-winged Blackbird, birds which pass the winter such a short distance south of us that they appear at the first sign of returning spring. Further confidence in the growth of the new year is shown by the Great Horned Owl, one of our less common species, which begins nesting late in February or early in March.

In spite of these movements among the birds, February is, generally speaking, a winter month, and it is only in exceptional years that we find much change in our bird-life.

BIRDS OF THE MONTH.

Permanent Residents, see page 85.
Winter Residents, see page 87.
Migrants arriving from the South.

February 15 to 28, in favorable seasons.

Purple Grackle.
Red-winged Blackbird.
Rusty Blackbird.
Robin.

March Bird-Life.—Although March is sure to witness a general northward movement among the birds, the date of their arrival is as uncertain as the weather of the month itself. Continued severe weather prevents an advance, which a higher temperature occasions. It is well, therefore, to watch the weather predictions, since birds will quickly follow in the wake of a warm wave.

When the ice leaves our bays, ponds and rivers, Ducks and Geese will appear. Even before this event, the Grackles, Red-winged Blackbirds and Robins will come in flocks and in song, and singing will become general with the Song Sparrows and Bluebirds, whose numbers will be greatly increased. When successive thaws have rendered the earth soft enough for the Woodcock's probe, we may expect to find him in favorable localities searching for his fare of earthworms. With the advent of insects, we may look for their enemy the Phœbe, and Meadowlarks, Cowbirds and other March Migrants may be found.

The weather which hastens the arrival of birds from the

South, also prompts certain of our Winter Visitants to begin their northward journey, and after March we do not often see Redpolls, Snowflakes or Northern Shrikes.

BIRDS OF THE MONTH.

Permanent Residents, see page 85.

Winter Residents, see page 87.

Winter Residents leaving for the North.

Horned Lark. Snowflake.
Redpoll. Pine Grosbeak.
Northern Shrike.

Migrants arriving from the South.

Appearing when the ice leaves the bays and rivers.

Loon. Green-winged Teal.
Pintail. Blue-winged Teal.
Mallard. Canada Goose.

March 1 to 10.

Purple Grackle. Rusty Blackbird.
Red-winged Blackbird. Robin.

March 10 to 20.

Woodcock. Meadowlark.
Phœbe. Cowbird.
Fox Sparrow.

March 20 to 31.

Wilson's Snipe. Mourning Dove.
Kingfisher. Swamp Sparrow.
White-throated Sparrow.

April Bird-Life.—In early April the developments in the vegetable world, which the most casual observer cannot fail to see, are accompanied by corresponding but less noticed activities in the world of birds. The appearance of the skunk-cabbage, the blossoming of the pussy-willow and the early wild flowers soon become common knowledge; but the arrival of the Vesper, Field and Chipping Sparrows, of Tree Swallows, Myrtle Warblers and Hermit Thrushes, is known to comparatively few. Still, to the bird-lover, the return of these feathered friends is of even greater interest than the blossoming of trees and plants.

The migratory movement grows rapidly in strength, and during the latter part of the month one may expect to see newcomers almost daily. It will be noted that the earlier migrants of the month are all seed-eaters, while the later are certain insectivorous birds which catch their prey in the air, for example, Swallows, Swifts and Nighthawks.

BIRDS OF THE MONTH.

Permanent Residents, see page 85.

Winter Residents, see page 87.

Winter Residents leaving for the North.

Junco.
Tree Sparrow.
Winter Wren.
Brown Creeper.
Red-breasted Nuthatch.
Golden-crowned Kinglet.

Migrants arriving from the South.

April 1 to 10.

Pied-billed Grebe.
Great Blue Heron.
Black-crowned Night Heron.
Osprey.
Vesper Sparrow.
Savanna Sparrow.
Field Sparrow.
Chipping Sparrow.
Tree Swallow.
Myrtle Warbler.
American Pipit.
Hermit Thrush.

April 10 to 20.

American Bittern.
Green Heron.
Clapper Rail.
Yellow-bellied Sapsucker.
Barn Swallow.
Yellow Palm Warbler.
Pine Warbler.
Louisiana Water-Thrush.
Ruby-crowned Kinglet.

April 20 to 30.

Spotted Sandpiper.
Semipalmated Sandpiper.
Whip-poor-will.
Chimney Swift.
Least Flycatcher.
Towhee.
Blue-headed Vireo.
Purple Martin.
Cliff Swallow.
Bank Swallow.
Rough-winged Swallow.
Black and White Warbler.
Black-throated Green Warbler.
Brown Thrasher.

May Bird-Life.—As the season advances, marked changes in temperature are less likely to occur, and the migration becomes regular and continuous. In February and March there may be two weeks or more variation in the times of arrival of the same species in different years; in May we expect to find a given species within a day or two of a certain date. We shall, nevertheless, find the force of the migratory current still closely dependent on the weather, and under the encouragement of a high temperature we may be visited by "bird waves," flooding the woods with migrants. Birds are then doubtless more abundant than at any other season. As many as ten species may be noted as arriving on the same day, and sixty or seventy species may be observed within a few hours.

After May 15, birds begin to decrease in number, the Transient Visitants passing farther north, and by June 5 we have only Permanent Residents and Summer Residents.

BIRDS OF THE MONTH.

Permanent Residents, see page 85.
Summer Residents, see page 86.

Migrants arriving from the South.

May 1 to 10.

Common Tern.
Solitary Sandpiper.
Semipalmated Plover.
Yellow-billed Cuckoo.
Black-billed Cuckoo.
Nighthawk.
Ruby-throated Hummingbird.
Crested Flycatcher.
Kingbird.
Baltimore Oriole.
Orchard Oriole.
Bobolink.
Grasshopper Sparrow.
Indigo Bunting.
Rose-breasted Grosbeak.
Scarlet Tanager.
Red-eyed Vireo.
Warbling Vireo.
Yellow-throated Vireo.
White-eyed Vireo.
Nashville Warbler.
Blue-winged Warbler.
Parula Warbler.
Black-throated Blue Warbler.
Magnolia Warbler.
Yellow-breasted Chat.
Chestnut-sided Warbler.
Prairie Warbler.
Small-billed Water-Thrush.
Hooded Warbler.
Yellow Warbler.
Maryland Yellowthroat.
Oven-bird.
Redstart.
House Wren.
Catbird.
Wood Thrush.
Veery.

May 10 to 20.

Wood Pewee.
Acadian Flycatcher.
Yellow-bellied Flycatcher.
White-crowned Sparrow.
Golden-winged Warbler.
Tennessee Warbler.
Worm-eating Warbler.
Cape May Warbler.
Blackburnian Warbler.
Bay-breasted Warbler.
Black-poll Warbler.
Wilson's Warbler.
Canadian Warbler.
Long-billed Marsh Wren.
Short-billed Marsh Wren.
Olive-backed Thrush.
Gray-cheeked Thrush.
Alder Flycatcher.
Mourning Warbler.
Bicknell's Thrush.

June Bird-Life.—After June 5 we may be reasonably sure that, with a few exceptions, every bird seen has or has had a nest in this vicinity. Several of the birds which began nesting in April will rear second broods in June, while the young of other April-nesting birds may not leave the nest until June. All the birds that began nesting in May will still be occupied with household affairs in June, and when we add to these the late-breeding species that wait for June before settling their domestic arrangements, it will be seen that among birds June is the home month of the year.

Nest-building, egg-laying, incubating and the care of the young now make constant and exceptional demands on birds which, in response, exhibit traits which at other times of the year they give no evidence of possessing. Singing now reaches its highest

development, and certain call-notes are heard only at this season. The numberless actions incident to courtship, the intelligence displayed in nest-building, the choice of special food for the young, the devotion which prompts the parents recklessly to expose themselves in protecting their offspring,—all these manifestations of the bird-mind may be observed in June.

BIRDS OF THE MONTH.

Permanent Residents, see page 85.
Summer Residents, see page 86.

July Bird-Life.—The full development of the bird year is attained in June, and as early as the first week in July the season begins to wane, when, among some migratory birds, there are evidences of preparation for the journey southward.

The young of certain species which rear but one brood a year have now left the nest, and, accompanied by the parents, wander about the country. In localities which we had thoroughly explored in June, we may now find species not met with then. In some cases these families join others of their kind, forming small flocks, the nuclei of the great gathering seen later. Examples are Grackles, Red-winged Blackbirds and Tree Swallows. The last named increase rapidly in number, and by July 10 we may see them flying over late each afternoon *en route* to their roosts in the Hackensack marshes.

During the first week in the month we shall also find that certain birds have concluded their season of song. Bobolinks and Red-winged Blackbirds are rarely heard after the 10th of the month; their young are reared, the cares of nesting-time are passed, and with other one-brooded birds they begin to renew their worn breeding plumages by molting. After the 15th we miss the voices of the Veery, Orchard and Baltimore Orioles, Chat, Brown Thrasher and other birds.

BIRDS OF THE MONTH.

Permanent Residents, see page 85.
Summer Residents, see page 86.

August Bird-Life.—With the majority of our nesting birds, family cares are ended in August, and at this season they completely renew their worn plumages by molting. When molting, birds are less in evidence than at any other time. What becomes of many of our birds in August it is difficult to say. Baltimore Orioles, for example, are rarely seen from August 1 to 20, but after the latter date they reappear clad in full plumage, and they are then in nearly full

song. So apparently complete is the disappearance of birds in August, that before the fall migration brings new arrivals daily from the north, one may spend hours in the woods and hear only the Red-eyed Vireo and the Wood Pewee, August's own songsters.

Late in the month, migrants from the north travel through the woods in small companies, but the characteristic bird-life of August is in the marshes. There the Swallows come in increasing numbers to their roosts in the reeds, while Red-winged Blackbirds and Bobolinks, under the alias of Reedbird, are abundant where the wild rice grows.

BIRDS OF THE MONTH.

Permanent Residents, see page 85.
Summer Residents, see page 86.
Migrants arriving from the North.

August 1 to 15.

Sora.
Semipalmated Sandpiper.
Semipalmated Plover.
Yellow-bellied Flycatcher.
Golden-winged Warbler.
Chestnut-sided Warbler.
Canadian Warbler.
Small-billed Water-Thrush.

August 15 to 31.

Olive-sided Flycatcher.
Tennessee Warbler.
Nashville Warbler.
Parula Warbler.
Cape May Warbler.
Black-throated Green Warbler.
Black-throated Blue Warbler.
Magnolia Warbler.
Blackburnian Warbler.
Wilson's Warbler.
Red-breasted Nuthatch.

September Bird-Life.—The student whose patience has been sorely tried by the comparative scarcity of birds in August will find that in September his observations in the field will be attended by far more interesting results. The first marked fall in the temperature is sure to be followed by a flight of migrants which, like the "bird waves" of May, will flood the woods with birds. By far the larger number will be Warblers; indeed, September, like May, is characterized by the abundance of these small birds.

Birds of the year will outnumber the adults, and in most cases their plumage will be quite unlike that worn by their parents in May. In many instances, even the adults themselves appear in a changed dress. As a rule, fall plumages are less striking than those of spring, and when, in addition, it is remembered that birds are not in song, and that the foliage is much denser, the greater difficulty of identifying birds in the field will be appreciated.

About September 25 our more common Winter Visitants arrive from the north, but afterward birds decrease rapidly in number.

BIRDS OF THE MONTH.

Permanent Residents, see page 85.

Summer Residents, see page 86.

Summer Residents leaving for the South.

September 1 to 10.

Acadian Flycatcher.
Orchard Oriole.
Rough-winged Swallow.
Worm-eating Warbler.
Blue-winged Warbler.

September 10 to 20.

Baltimore Oriole.
Purple Martin.
Yellow Warbler.
Yellow-breasted Chat.

September 20 to 30.

Common Tern.
Green Heron.
Hummingbird.
Kingbird.
Crested Flycatcher.
Wood Pewee.
Rose-breasted Grosbeak.
Yellow-throated Vireo.
Warbling Vireo.
Hooded Warbler.
Louisiana Water-Thrush.
Veery.

Migrants arriving from the North.

September 1 to 10.

Lincoln's Sparrow.
Black-poll Warbler.
Connecticut Warbler.

September 10 to 20.

Wilson's Snipe.
Blue-headed Vireo.
Olive-backed Thrush.
Bicknell's Thrush.

September 20 to 30.

Herring Gull.
Green-winged Teal.
Blue-winged Teal.
American Coot.
Junco.
White-throated Sparrow.
White-crowned Sparrow.
Myrtle Warbler.
Yellow Palm Warbler.
Brown Creeper.
Golden-crowned Kinglet.
Ruby-crowned Kinglet.
Winter Wren.
Gray-cheeked Thrush.

October Bird-Life.—Early October generally brings the first killing frost, depriving insectivorous birds of a large part of their food and forcing them to journey southward. Flycatchers, Warblers, Vireos and Swallows now take their departure, and after the 15th of the month few insect-eating birds remain, except those which, like Woodpeckers, feed on insect's eggs or larvæ.

This is the season of Sparrows. In countless numbers they throng old stubble, potato and corn fields, doing untold good by destroying the seeds of noxious weeds. With these birds will be the lately arrived Juncos, Tree Sparrows and Fox Sparrows. When disturbed, all seek shelter in the nearest hedgerow, and their mingled notes produce a twittering chorus in which it is difficult to distinguish the voices of individual birds.

This, however, will not be the only bird music of the month. Certain species now have a brief second song period, and on the brighter days of the month we may hear Song, White-throated and Fox Sparrows, Phœbes and Ruby-crowned Kinglets singing.

BIRDS OF THE MONTH.

Permanent Residents, see page 85.

Summer Residents, see page 86.

Summer Residents leaving for the South.

October 1 to 10.

Black-crowned Night Heron.
Yellow-billed Cuckoo.
Black-billed Cuckoo.
Chimney Swift.
Least Flycatcher.
Bobolink.
Grasshopper Sparrow.
Indigo Bunting.
Scarlet Tanager.
Cliff Swallow.
Barn Swallow.
Bank Swallow.
White-eyed Vireo.
Black and White Warbler.
Oven-bird.
Redstart.
Wood Thrush.

October 10 to 20.

Spotted Sandpiper.
Whip-poor-will.
Nighthawk.
Red-eyed Vireo.
Maryland Yellowthroat.
Catbird.
Brown Thrasher.
House Wren.
Short-billed Marsh Wren.
Long-billed Marsh Wren.

October 20 to 31.

Pied-billed Grebe.
Phœbe.
Towhee.
Tree Swallow.

Migrants arriving from the North.

October 1 to 10.

Loon.
Pintail.
Mallard.
Canada Goose.
Bronzed Grackle.
Rusty Blackbird.
American Pipit.
Hermit Thrush.

October 10 to 20.

Fox Sparrow.

October 20 to 31.

Horned Lark.
Pine Finch.
Tree Sparrow.
Snowflake.
Redpoll.
Northern Shrike.

November Bird-Life.—It is an interesting fact that the last migrants to leave in the fall are the first to arrive in the spring. The bird-life of November, when the fall migration is practically concluded closely resembles, therefore, that of March, when spring migration is inaugurated. The reason for this similarity is to be found in the fact that both months furnish birds with essentially the same kind of food. Thus the Loon, Grebes, Ducks, Geese and

Kingfisher remain until the forming of ice in November or early December deprives them of food and forces them to seek open water; while Woodcock and Snipe linger until they can no longer probe the frost-hardened earth. The thaws of March, however, will bring all these birds back to us by restoring their food. Certain Sparrows stay with us until the weed-bearing seeds on which they feed are covered by snow, when they are compelled to retreat farther southward, only to return, however, when the March sun lays bare the earth. Few birds' songs are heard in November. In some sheltered spot Song and White-throated Sparrows may continue in voice, but the characteristic bird-note of the month is the scatter-call or fall whistle of Bob-White.

BIRDS OF THE MONTH.

Permanent Residents, see page 85.

Migrants leaving for the South.

Wood Duck.
American Bittern.
Great Blue Heron.
Woodcock.
Mourning Dove.
Belted Kingfisher.
Cowbird.
Red-winged Blackbird.
Purple Grackle.
Vesper Sparrow.
Chipping Sparrow.
Field Sparrow.
Swamp Sparrow.

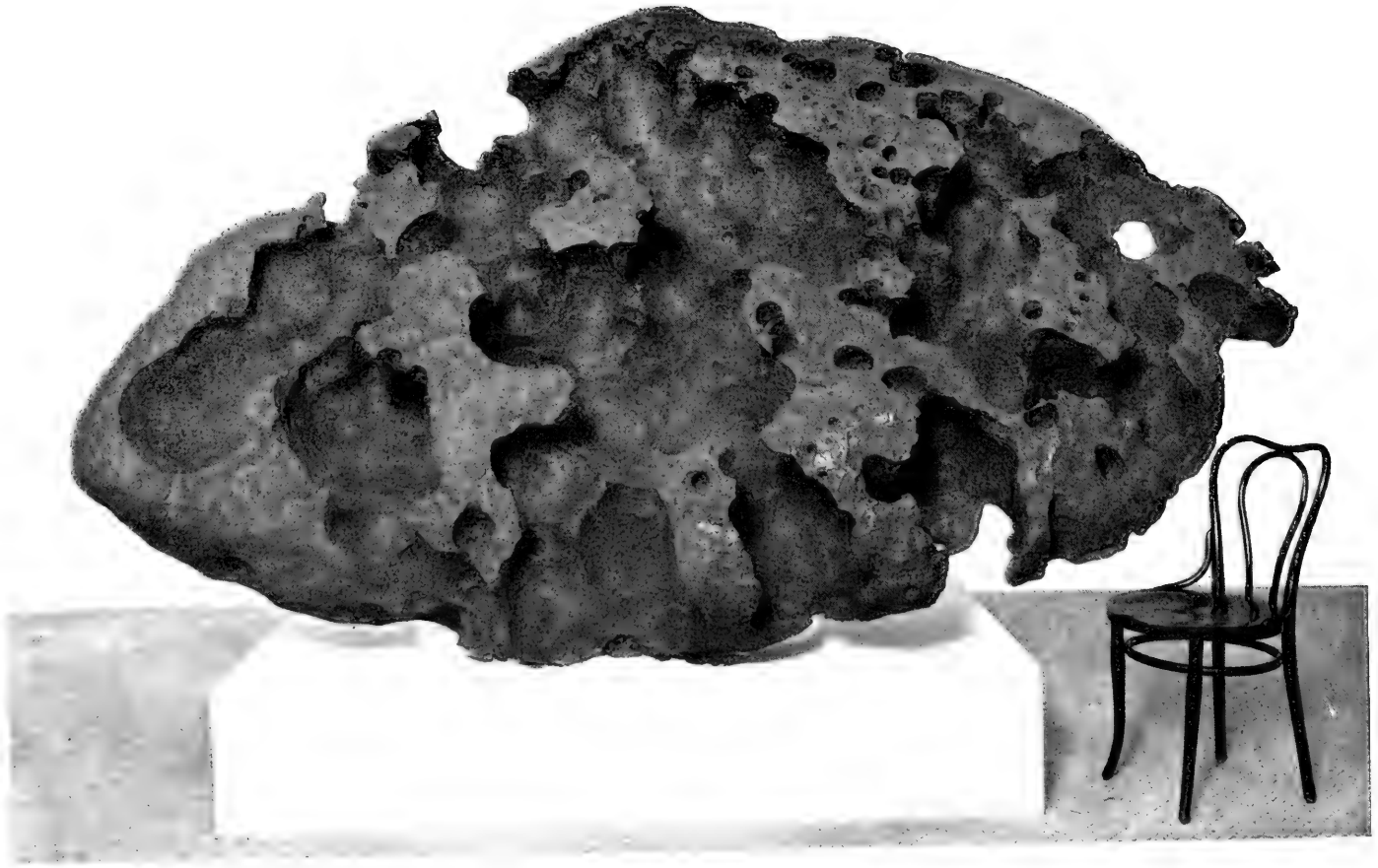
December Bird-Life.—The character of the bird-life of December depends largely upon the mildness or severity of the season. Should the ponds and streams remain open, the ground be unfrozen and little or no snow fall, many of the migrant species of November will linger into December.

The comparative scarcity of food now forces birds to forage actively for provisions, and when a supply is found, they are apt to remain until it is exhausted. Their wanderings in search of food lead them over large areas, and our dooryards and orchards may often be visited by species which, when food is more abundant, do not leave their woodland haunts. An excellent means of attracting them is to provide suitable food. Crumbs and seeds scattered in some place where they will not be covered by snow or blown away will bring Juncos and Tree Sparrows; an old seed-filled sunflower head may prove a feast for Goldfinches, while bits of meat, suet or ham bone hung from a tree will be eagerly welcomed by Chickadees, Nuthatches and Downy Woodpeckers.

BIRDS OF THE MONTH.

Permanent Residents, see page 85.

Winter Residents, see page 88.



THE WILLAMETTE METEORITE

Gift of Mrs. William E. Dodge

Length 10 feet, height 6 feet 6 inches, weight 15.6 tons

The American Museum Journal

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THE WILLAMETTE METEORITE.

THE Museum is particularly fortunate in having secured, as a gift from Mrs. William E. Dodge, the Willamette Meteorite, the largest meteorite which has been found in the United States and one of the three largest known. The great hollows and deep pits which characterize the surface of the mass combine with its enormous size to make this the most remarkable and interesting meteorite known.

Willamette is a siderite, or a mass composed of an alloy of iron and nickel, and its chief dimensions are: length, 10 feet; height, 6 feet 6 inches; thickness, 4 feet 3 inches; weight, as determined upon the railroad scales at Portland, Oregon, 31,107 pounds. About 100 pounds can safely be added to this weight for portions removed and carried away between its discovery and the time of its acquisition by the Museum, so that it is within bounds to say that the weight of the mass when found was at least 31,200 pounds, or about 15.6 tons.

All the great meteorites that are comparable with Willamette in size and weight are likewise siderites, or irons. They are Ahnighito, weighing 36.5 tons, Bacubirito, estimated at about 27.5 tons, the larger Chupaderos, 15.5 tons, San Gregorio, 11.1 tons, the smaller Chupaderos, 6.9 tons, and Bemdegó, 5.9 tons. Willamette's dimensions exceed those of the larger Chupaderos, and it therefore ranks as the third known meteorite in both size and weight.

Ahnighito, or "The Tent," is the largest of the three iron meteorites brought to New York from Cape York, Greenland, by Commander Robert E. Peary, U.S.N., and with its associates, the "Woman" (6,000 pounds) and the "Dog" (1,100 pounds), is at this Museum. Bacubirito lies where it fell ages ago near the spot where now is located the little village in the State of Sinaloa, Mexico, which gives it its name. The two Chupaderos irons,

the San Gregorio, the Concepcion (7,315 pounds) and two or three smaller masses, together aggregating about 41 tons in weight, are considered by some authorities to be portions of one fall, which occurred in prehistoric time in the southern portion of the State of Chihuahua, Mexico. They are known as the Huejuquilla group of meteorites, and they now occupy positions of honor in the collection of the National School of Mines in the City of Mexico. Bemdegó was found in Bahia, Brazil, in 1784 and is now in the National Museum in Rio de Janeiro.

Willamette has had a rather romantic history. It is reported that, in the autumn of 1902, Mr. Ellis Hughes and a man named Dale were prospecting for minerals in the forest adjoining the ranch of the former in the valley of the Tualitin, a stream flowing into the Willamette River about nineteen miles above (south of) the city of Portland, Oregon, when their hammers showed that a mass projecting a little above the ground was of metal, not rock. The prospectors soon learned that the mass was iron and later discovered that it was an isolated block and a meteorite instead of a "reef" upon which could be located a great mine, as they supposed at first. The exact location of the spot where the meteorite was found is Lat. 45° 22′ N., Long. 122° 35′ W. (Ward).

Messrs. Hughes and Dale kept their find a secret, hoping to be able to buy the land containing the meteorite. Not succeeding in acquiring the land, Mr. Dale left the country, but Mr. Hughes determined to get the meteorite by force, if not otherwise, and in August of 1903 set about the task of removing it to his own land about three-quarters of a mile distant through a dense forest. He had only his 15 year old son and a horse to assist him, but all were plucky and after three months of almost incessant labor with appliances of the crudest description (principally a capstan and wire cable and a truck made of logs) the big meteorite rested upon the soil of the Hughes ranch.

Then came publicity for the meteorite, and the Oregon Iron and Steel Company, the owners of the land upon which it fell, learned of its existence and removal from their property. Suit was immediately instituted for its recovery, and the case was carried to the Supreme Court of the State of Oregon before

THE WILLAMETTE METEORITE

Western half of front, or "Brustseite," showing fusion and erosion hollows and cylindrical bore-holes

Mr. Hughes was willing to abandon his efforts to retain the specimen. Title to the great iron was established late in the summer of 1905, and the mass was removed at once to the Mines Building of the Lewis and Clark Exposition at Portland, where it was an object of great attention from thousands of visitors during the closing weeks of the fair. Early in February of the present year the specimen was acquired for this Museum.

In general form Willamette may be described as a broad-based, low cone. When discovered the blunt apex of this cone was buried deepest in the ground, and the flatter, oval base was uppermost. Although the mass lay so long in the ground as to lose entirely its original exterior through oxidation, the probabilities are that the conical side of the mass was forward in its journey through space and our atmosphere. It is the side known to scientists as the "brustseite" of the meteorite, but it would be popularly called the front. The characteristics of the meteorite have been fully described by Henry A. Ward,[1] but the attention of the scientific public was first called to the mass, under the name of "Clackamas Meteoric Iron," by George F. Kunz.

The most striking characteristic of Willamette next to its size is the series of hollows and deep pits which indent its surface. These are of four kinds: broad shallow hollows on the front side, (the side now turned toward the wall); deep, pot-like pits with undercut edges on the rear side of the mass (the side now facing the center of the Foyer); cylindrical holes like the bore holes of Canyon Diablo; small shallow depressions which are found over most of the surface.

The broad shallow hollows on the front side (brustseite) of the meteorite form basins and furrows or channels which are most numerous in the half of the cone farthest away from the apex. Some of these show an approximately radial orientation with the deeper ends away from the apex of the cone, and several look as if they might have been made with a tool like a gigantic "countersink." The broad portion of these pits is generally uphill from the usually pointed bottom. The most prominent of the basins is a double heart-shaped cavity, 18 inches long,

[1] Proc. Roch. Acad. Sci., Vol. iv, pp. 137–148, pl. 13–18. March 24, 1904.
[2] Science, N. S., Vol. xix, p. 108. January 15, 1904.

17 inches wide, and 10.5 inches deep, situated toward the east end of the meteorite in its present position. The form and arrangement of these basins indicate for them, according to Ward, an origin due to friction against the atmosphere and consequent melting and flowage of the surface of the iron. Willamette contains many nodules and cylindrical masses of troïlite (a sulphide of iron peculiar to meteorites), which is more easily fusible than the surrounding nickel-iron. These areas therefore may have formed the starting points for vortex action and consequent excavation by the condensed atmosphere during the flight of the meteorite through the air to the earth; but the original shape of the hollows must have been altered by subsequent oxidation.

It seems too much, however, to assert that all the depressions on the front of the meteorite are due to friction against the atmosphere. Those with basin-like lip and definite radial orientation may well be due primarily to this cause, though enlarged by subsequent terrestrial oxidation; but others with undercut edges and without radial orientation with reference to the apex of the cone are more probably the result of terrestrial oxidation, like the great cavities of the rear of the mass.

The channels which are observed near the edge of the meteorite are oriented like the basins just described and probably had the same origin. One of the channels is 21 inches long, 10 inches wide, and 7.5 inches deep. Perhaps they began around initial elongated masses of troïlite. Some of the channels, or furrows, connect with the great hollows of the rear side of the meteorite, piercing the mass.

The deep, pot-like pits of the rear portion of Willamette are the most striking superficial characteristic of the meteorite. Some are nearly circular in outline, while others are very elongate ellipses. The largest two are irregular ellipses about 42 inches long, 18 inches wide, and 17 and 18 inches deep. These great pits are compound, their bottoms showing that several small cavities have coalesced to form the large ones. All the cavities on this side of the meteorite increase in diameter below the orifice, *i. e.*, they are undercut. Some of the large cavities have smaller holes of the same character in their bottoms which were

THE WILLAMETTE METEORITE

Eastern half of front, or "Brustseite," showing fusion and erosion hollows and channels

discovered only when the thick rust and scale within them had been removed. The bottoms of the great cavities extend to essentially the same plane, about 18 inches below the general external surface.

Between the cavities there are hourglass-shaped pillars with nearly flat tops in which are many small flask-shaped holes three or more inches deep with orifices half an inch to one and one-half inches across. These are arranged in definite lines extending obliquely across the base of the meteorite in two directions nearly at right angles to each other. The great cavities are arranged in corresponding manner with their longer diameters parallel to one or the other system of lines of small holes. The character and arrangement of the cavities on the rear side of the meteorite indicate clearly that we have here a result of decomposition and erosion. Exactly analogous pits and cavities have been observed in beds of limestone and gypsum, where there can be no doubt of their erosional origin.

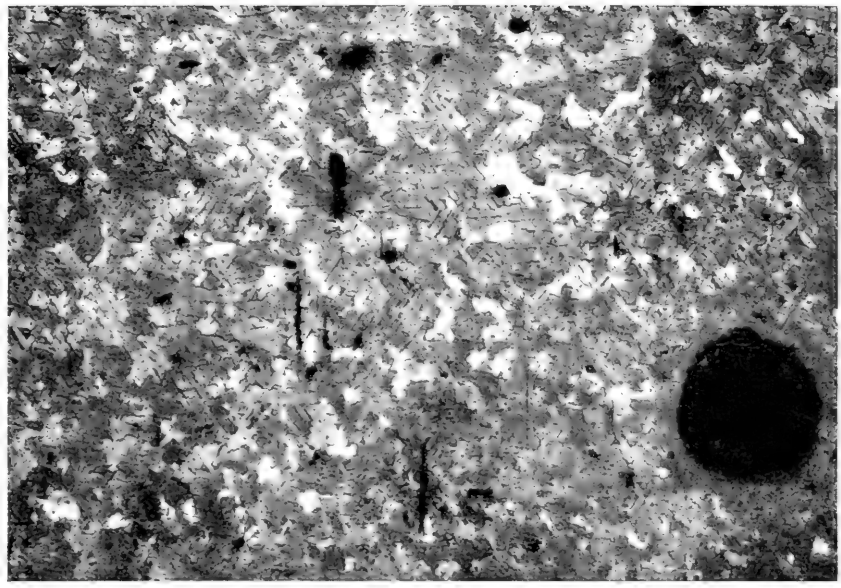
The climate of the region where the meteorite was found is extremely moist, without excessive rainfall, and there is comparatively little snow and ice, hence the conditions are exceptionally favorable to rapid oxidation and disintegration. The land is forest-covered, so that humus acids and carbonic acid are supplied in abundance to assist the destructive work of the water. The process seems to have been a simple one, the nodules and rods of troïlite which are scattered through the mass having formed centers of ready attack for the oxidizing agents. These areas of troïlite have been near enough together in certain directions to lead to the speedy coalescence of the cavities produced and the consequent formation of the great elongate basins. Troïlite nodules may be seen now in several of the cavities.

The cylindrical holes are somewhat irregular in their shape below the orifice. They are from $1\frac{1}{2}$ to 3 inches in diameter and of varying depth up to 6 or 8 inches. They show most clearly in the illustration on page 107 along the upper rim of the meteorite. These holes resemble the bore-holes of Canyon Diablo, Chupaderos and other iron meteorites, and are thought to have been begun by fusion or erosion of rod-like masses of troïlite.

The small, shallow depressions which Professor Ward has

identified as "piezographs" are most conspicuous in a border zone eighteen or twenty inches wide which extends entirely around the rear of the mass. They are from one to three inches in diameter, with a depth approximately one-eighth as great. True piezographs, however, are surface features and are assigned to the heating and attrition due to the action of the greatly condensed air upon a meteorite and particularly upon the front, or brustseite, during its flight through the earth's atmosphere. Three considerations show that the small shallow depressions referred to upon Willamette are not piezographs: they are more abundant upon the rear than upon the front of the mass; they cover the inner surface of the great decomposition cavities in the rear, where they could not possibly have been caused by the friction of the atmosphere, as well as the exterior of the mass; the present exterior surface of the meteorite cannot be considered the original surface at the time of fall, and it may be far removed therefrom. Many pounds of rust and scale were left in the ground when Willamette was lifted out of its first earthly resting place, and it is not probable that the present surface bears any trace of the minor characteristics of the original surface. These slight depressions therefore are to be regarded as one of the features of the great iron which are due to unequal oxidation.

The internal character of the mass has been studied on an etched section in the Ward-Coonley Meteorite Collection on deposit in the Museum and on broken surfaces of the meteorite itself. The fracture shows the iron to be remarkable for its coarsely granular texture, the grains being bounded by almost definite planes suggesting crystals. The etched surface shows that Willamette is to be placed among the Broad Octahedrites (Og), No. 56 of Brezina's system of classification. In this class the lamellæ composing the iron are from 1.5 to 2 mm thick. The lamellar structure is somewhat obscured by plates, or flakes, of brighter and more lustrous iron. Most of these areas seem to have no definite outline, but the presence of Neumann lines on the larger ones indicates a crystalline character for them different from that of the main mass as indicated by the lamellæ (Ward). The pronounced lamellæ are the purer iron and are called kamacite, the definite lines bounding the kamacite plates are rich in



THE WILLAMETTE METEORITE

Polished and etched section showing Widmanstätten lines. The black spots are nodules and rods of Troilite. Natural size. Ward-Coonley Collection.

THE WILLAMETTE METEORITE H. A. Ward, Photo.

In the forest near Oregon City, Oregon

nickel and are known as tænite, the metal filling in the spaces between the plates is known as plessite and is scanty in this meteorite. Troïlite shows abundantly in the section as well as in the surface of the main mass. Schreibersite, the brilliant meteoritic phosphide of iron and nickel, is not in evidence to the unaided eye.

Two analyses of Willamette have been made for Professor Ward and are here quoted:

J. M. Davison.		J. E. Whitfield.	
Iron	91.65%	Iron	91.46%
Nickel	7.88	Nickel	8.30
Cobalt	.21		
Phosphorus	.09		99.76
	99.83		

The specific gravity is 7.7.

EDMUND OTIS HOVEY.

THE EAST MAMMAL HALL.

THE East Mammal Hall (No. 207 of the Second Floor), leading out of the Hall of North American Mammals, has been opened to the public within a few weeks. The center of the room is occupied by a noble group representing five Olympic Elk beside a spring in the mountains. These are some of the latest productions of the Department of Taxidermy and are displayed without glass covering, for the purpose of avoiding the reflections due to great expanses of glass. The animals were collected in the Olympia Mountains of Washington. Other noteworthy mammal groups in this hall are those of the Musk Ox and the Caribou from the Stone Expeditions to Alaska and the Prong-horned Antelope. A small group consisting of a pair of the California Mule Deer from Lower California shows this graceful animal in pleasing attitudes. A single specimen of the Alaska Brown Bear, which was collected by Mr. Stone, illustrates one of the largest members of this family of beasts.

The southern side of the hall is devoted to reptiles and here will be found many single specimens and the groups representing

the Iguana and the Texas Rattle Snake. A new group of the series is one representing the Diamond Back Rattle Snake of Florida. The larger of the specimens in this group is 7 feet in length and has twelve rattles and two buttons. The Diamond Back and the Texas Rattler are the largest members of the Rattle Snake family and their strike is far more deadly than that of the northern varieties, probably on account of their size and weight and the great length of their fangs. The specimens mounted in this group were presented by the New York Zoölogical Society, and the accessories were collected by Mr. E. J. Brown.

The northern side of the hall is devoted to an educational synoptic exhibit illustrating the ethnology of the principal tribes of the Philippine Islands, a special feature of which is the series of photographs and window transparencies illustrating the habitations and the customs of the people. The sketch maps placed in each case enable the visitor to learn at a glance the location of the tribe which he is studying.

The tower room beyond the East Mammal Hall is devoted to reptiles and batrachians, particularly those of the vicinity of New York City, which are described in the two Guide Leaflets on these animals which have been issued by the Museum.

THE NEW BUILDING.

GROUND for the south wing of the west façade of the Museum building was broken May 21 and the excavation for the new building is now well advanced. The new wing is to be 157 feet long and 66 feet 2 inches wide, corresponding in style with the side wings of the southern façade. A one-story extension on the east side has been provided for the accommodation for certain special Japanese and Chinese exhibits. The basement will be devoted to the carpenter shop and other workshops of the Museum. Above the basement there will be four large exhibition halls. The fifth story will be devoted to laboratories and offices, while some much-needed storerooms will be made in the attic. There will be an underground passageway 12 feet wide and 12 feet high from the north end of the basement to

the engine room. A driveway will be made through the north end of the basement, which will be continued around the inner court to give direct connection with other parts of the building, and tracks will be laid from the surface car line on Columbus Avenue which will traverse this roadway and permit cars to discharge passengers at the entrance to the large auditorium, an improvement which is particularly desired for handling the crowds which attend the afternoon lectures to the public-school children.

JOSEPH H. BATTY.

ON May 27, Mr. J. H. Batty, the veteran collector, was instantly killed by the accidental discharge of his gun while on an expedition for this Museum at Pijijiapa, Chiapas, Mexico. Mr. Batty was a collector of wide experience in tropical America, and was especially successful in securing the larger Carnivores, so poorly represented in all museums. He was a man of great energy and determination, an enthusiastic collector and hunter, and fearless almost to a fault. He was under engagement with this Museum to continue his work across Guatemala and thence to the Cauca region of southwestern Colombia. His tragic death is thus a serious loss not only to this Museum but also to science. Mr. Batty was born at Springfield, Mass., about 60 years ago, but apparently retained his remarkable physical vigor unabated to the end. He fitted for college, but early abandoned his college course for, to him doubtless, more attractive pursuits, and he spent his life as a taxidermist and natural history collector. He was the author of a work on taxidermy and published one or two other books. Personally he was kindhearted and conscientious.

THE Bierstadt painting representing the landing of Columbus which was recently given to the Museum by Mrs. Albert Bierstadt has been mounted temporarily and placed on exhibition in the Hall of Southwestern Indians (No. 202 of the Second Floor).

AN EXPEDITION TO CULEBRA AND PORTO RICO.

DURING the winter Professor N. L. Britton, director of the New York Botanical Garden, organized an expedition to Culebra and Porto Rico and very kindly invited Professor W. M. Wheeler to accompany him for the purpose of studying the terrestrial invertebrate fauna of the islands. The party reached San Juan, Porto Rico, March 1, when Professor Britton, Doctor Marshall A. Howe and Professor Wheeler left the remainder of the party and were conveyed on the U. S. naval tug "Peoria" to Culebra, a dry, hilly island with an area of about 12 square miles, half way between the eastern end of Porto Rico and the Danish island St. Thomas. Capt. B. F. Walling, commandant of the naval station at Culebra, courteously provided quarters for the party on board the U. S. supply ship "Alliance," at anchor in the beautiful land-locked harbor, and furnished a temporary laboratory on the adjacent shore. Capt. Walling and Capt. T. F. Lynn, commanding the marines at Culebra, did everything in their power to assist the party in their exploration of the island. Launches and small boats were provided for work along the shore and horses for reaching the remoter parts of the island. Ten days were spent in a careful biological survey of the region, Professor Britton working on the land plants, Doctor Howe on the marine algæ and Professor Wheeler on the terrestrial invertebrates. A practically complete series of the myriapods, spiders, ants and other insects was secured for the American Museum.

On completing the work at Culebra the party returned to San Juan and on March 13 joined the other members of the party, Mrs. Britton, Miss Delia Marble and Mr. John F. Cowell, director of the Buffalo Botanical Garden, at Arecibo on the northern coast of the island. Carriages were obtained at Arecibo and the whole party traveled across the mountains on the fine new turnpike through scenery of exquisite beauty, in the direction of Ponce. The little mountain town of Utuado on this route was selected as an appropriate base for a week's collecting. Many specimens were taken in the cafetals and platanals of the ravines along the Rio Grande, a charming mountain stream

which flows by Utuado, and excursions were made to two neighboring mountains, Morales and Mandios, for the purpose of studying the fauna and flora in the dense primeval forests on their summits.

Pursuing its journey, the party arrived at Ponce on the southern coast of the island on March 21. For the purpose of collecting on the dry southern slope of the sierra an excursion was made to Tallaboa and Peñuelas. A number of *Cerion* shells were gathered near the former locality, which in its fauna and its drought conditions offers a striking resemblance to certain parts of the Bahamas. From Ponce the expedition returned to San Juan along the old Spanish military road, with a stop of parts of two days at Coamo Springs and frequent stops near Aibonito and Caguas. After reaching San Juan, where it was necessary to wait a few days for the steamer to New York, an excursion was made to the peculiar limestone cliffs about Vega Baja.

Although only four weeks could be devoted to the work, a large amount of botanical and zoölogical material was secured by the expedition. Professor Britton and his botanical staff collected 1456 numbers of land plants, averaging three or four specimens to a number, and 231 collection numbers of marine algæ, more than 6000 specimens altogether. Professor Wheeler secured an extensive collection of the ants of Culebra and Porto Rico, regions from which no ants have been described heretofore. This collection contains some 5000 specimens, representing about 60 species, subspecies and varieties. A new fungus-growing ant of the genus *Cyphomyomex* was discovered and the peculiar and hitherto unknown fungus-gardens of *Mycocepurus smithi* Forel were studied. A new wingless fly (*Pulicifphora borinquenensis* sp. nov.) was taken at Utuado, and a new arachnid belonging to the remarkable group of the Tartarides (*Schizomus brittoni* sp. nov.) was secured at Coamo Springs. The series of myriopods, spiders and termites also comprises several undescribed species.

NORTH AMERICAN BIRD GROUPS

MESSRS. Chapman, Figgins and Horsfal went to the Far West in the latter part of April to obtain animals and accessories for several groups. Their first stop was on the United States Forest Reserve in Nebraska, where they gathered materials for the Prairie Chicken and the Burrowing Owl groups. Mr. Chapman was particularly fortunate in getting some excellent photographs, the first ever taken, of the Prairie Chicken in the acts of strutting and booming. He erected his blind on the open prairie and was in it while nineteen of the birds were going through the evolutions at one time around him, entirely unconscious of his presence.

From Nebraska the party went to Tucson, Arizona, where specimens were collected for the Desert Bird group, together with reptiles, small mammals and vegetation for accessories. Material was gathered here too for the group of Allen's Jack Rabbit.

From Arizona the party, with the exception of Mr. Horsfal, went to southern California for additional material, and then went northward to Salt Lake City, thence to eastern Wyoming, where Mr. Figgins left the party to return to New York, and Mr. Chapman remained to collect Sharp-tailed Grouse on the plains and afterward go into the Rocky Mountains in quest of the Golden Eagle and other birds. Two of the most important features of the work are the color sketches and photographs obtained for use in making the group surroundings of the birds true to nature.

This expedition has been made possible through the generosity of the contributors to the North American Ornithological Fund, a fund which has been provided by several friends of the Museum for the adequate representation here of characteristic American birds, many of which are becoming exceedingly rare.

THE use of the Nature Study collections continues to expand. During the school year which has just closed 400 cabinets containing the collections have been in circulation among 269 schools, and the teachers report that they have been studied by 690,333 pupils.

FIELD WORK OF THE DEPARTMENT OF VERTEBRATE PALÆONTOLOGY

THE Department of Vertebrate Palæontology has three expeditions in the field for the season. One, under the leadership of Mr. Barnum Brown, will continue the search for Dinosaurs in the Cretaceous beds of Montana which has been prosecuted during the last two years with considerable success. Several very valuable specimens have already been obtained in this region, which was first brought to the attention of this Museum by Dr. W. T. Hornaday, director of the New York Zoölogical Park, Bronx Park. The most remarkable of these specimens is the gigantic carnivorous Dinosaur which Professor Osborn has named *Tyrannosaurus*, and of which he expects shortly to publish an extended description and restoration. A large part of the skeleton in splendid preservation has been found, and it is hoped that further quarrying in the hill where these remains were discovered will bring to light the remainder of the skeleton, so that it can be mounted. A fine skeleton of a Duckbilled Dinosaur found by ranchmen in the same region has been purchased by the Museum and will be disinterred and brought to New York this year. Other prospects already located are to be investigated, and a diligent search made for more. It is especially desirable to obtain a skeleton of the Horned Dinosaur *Triceratops*, of which we have already a fine skull from this region.

A second party under Mr. Walter Granger will continue the search for fossil mammals in the Eocene formations of Wyoming. The American Museum already possesses unrivaled collections from these formations, and it is desired to round out and complete them as fully as possible by thorough and systematic search in all the known localities where they occur. These fossils are of much scientific and considerable popular interest, since they represent the early stages in the evolution of the various races of mammals which now inhabit the earth as well as of the others which have become extinct. Mr. Granger's explorations in the Bridger basin during the last three seasons have already added largely to our collections, and the careful records and observations of our parties will help to solve several puzzling problems.

Particular attention will be given to any data bearing on the climate and conditions of life in that region when the Uintatheres and hornless Titanotheres, Four-toed Horses, primitive Rhinoceroses, carnivores, rodents and insectivores inhabited it, and on how their remains came to be entombed in the rock strata where they are found. It has already been discovered that the Bridger formation is derived from volcanic ashes, so that active volcanoes must have existed at no great distance. This may be at least partly true of the other Eocene formations also. It is probable, too, that the climate was then very different from that of the present day, and the height of the region above sea-level much less than now.

The third expedition under Mr. Albert Thomson will search the later Tertiary formations of South Dakota for fossil mammals and especially for Three-toed Horses. Previous explorations in this region and elsewhere have shown that there was a great number and variety of Three-toed Horses in America during the later Tertiary epochs, but most of them are incompletely known and the problem of the direct ancestry of the modern Horse is not yet satisfactorily solved. Doctor Matthew and Mr. Gregory will join the expedition during a part of the season and Professor Osborn hopes to be with Mr. Brown's party in Montana for a short time.

THE CONARD-FISSURE GROUP

THE Department of Vertebrate Palæontology has placed on exhibition in its hall a model of the Conard Fissure in northern Arkansas, an open crack formed by small upheavals of the earth's surface, in which have been found great numbers of fossil bones. The fissure is located in the forest-covered Ozark Hills about fifteen miles south of the town of Harrison. During the Pleistocene epoch it was open and was inhabited by large and small carnivorous animals, such as the bear, tiger and weasel, and by rats, mice, birds and snakes, the bones of which, together with those of other beasts which they had dragged into their lairs to devour and gnaw at leisure, were buried in the earthy and stony accumulations. About 10,000 skulls, jaws and

other bones were collected for the Museum, and these are but a small fraction of the entire number in the fissure. More than sixty different species of mammals, birds and reptiles, chiefly of a forest fauna, have been recognized, some of which still live in the same region. Many others now inhabit near and remote northern parts of the continent, while twenty-four species are entirely extinct. The fissure has thus given us a record of some of the kinds of animals in Arkansas at the time of the most southern extent of the great ice-sheet of the Glacial Period. A systematic series illustrating the different species found in this interesting fissure is in process of installation in a case which has been placed temporarily in the Dinosaur Hall.

THE SHETLAND PONY SKELETON.

THE series of specimens in the Horse Alcove of the Hall of Vertebrate Palæontology has been enriched by a beautiful skeleton of an adult Shetland pony, which was prepared and mounted at the Museum by Mr. S. H. Chubb. The skeleton represents the animal as if grazing, which admits the display of great skill in the adaptation of the bones to the necessities of the case. The downward reach of the head causes the backbone to be considerably arched, and this necessitates raising the angle of the pelvis several degrees toward the vertical, increasing the length of the hind limbs and tilting the body forward. The head is turned to the right, producing interesting curves in the backbone. The attitude of all the bones has been determined from a most careful study of photographs of the animal while alive. An examination of the skeleton shows that the weight of the body falls on the right front and the left hind foot, bringing them both very near the median line, modifying the position of the scapulæ and elevating the left side of the pelvis.

The skeleton of the Shetland pony has been placed beside that of the great Percheron draft horse, marking the extremes of development produced by artificial selection. The contrast between the two animals is well shown in the following table of measurements:

	Shetland Pony.	Percheron.
Weight	170 lbs.	2160 lbs.
Height	$33\frac{3}{8}$ in.	5 ft. $6\frac{1}{2}$ in.
Bulk of humerus	$9\frac{1}{2}$ cu. in.	114 cu. in.
Bulk of femur	$13\frac{1}{2}$ cu. in	$155\frac{1}{4}$ cu. in.

THE RUSSEL GULCH METEORITE.

THROUGH the generosity of Professor C. F. Chandler of Columbia University the Museum has received as a gift more than one-third of the original and unique mass of the Russel Gulch meteorite, together with a cast of the whole. The weight of this portion of the meteorite is eleven pounds and three ounces. The specimen shows an etched face covering an entire section through the mass, giving coarse and somewhat wavy outlines of kamacite rods, in marked contrast with the fine structure in the example of the same meteorite in the Ward-Coonley collection of meteorites.

This meteorite was found in Russel Gulch, Gilpin County, Colorado, in 1863 and was first described by Professor J. Lawrence Smith in the *American Journal of Science* in 1866. The original mass weighed 29 pounds.

THE AMERICAN ASSOCIATION OF MUSEUMS.

On May 15 a convention was held at the Museum for the purpose of organizing an association of the museums of North and South America. The attendance was large, and among those who came from great distances in order to testify to their interest in the movement were Mr. W. A. Bryan, of the Bernice Pauahi Bishop Museum, Honolulu; Professor J. E. Talmage, of the Deseret Museum, Salt Lake City; Professor E. H. Barbour, of the University of Nebraska; and Doctor P. M. Rea, of the Museum of the College of Charleston, S. C. The Field Museum of Chicago, the Art Institute of Chicago, the St. Louis Public Museum, the various museums and art institutions of Boston and vicinity, the museums of various kinds located in the vicinity

of New York, as well as the museums of Philadelphia, Pittsburg and other leading cities, were well represented.

The meeting was called to order at 10:30 A.M., by Doctor W. J. Holland, of the Carnegie Museum, and upon his motion Doctor Hermon C. Bumpus, of the American Museum, was made temporary chairman. Doctor George A. Dorsey of the Field Museum was made temporary secretary. A committee on permanent organization, consisting of Doctor W. J. Holland, of the Carnegie Museum; Doctor Wm. M. R. French, of the Art Institute of Chicago; Doctor P. M. Rea, of the College of Charleston; Professor James E. Talmage, of the Deseret Museum of Salt Lake City; and Doctor W. P. Wilson, of the Philadelphia Commercial Museums, was appointed.

A final organization was effected by the election by ballot of Doctor Hermon C. Bumpus as president, Doctor Wm. M. R. French as first vice-president and Doctor W. J. Holland as second vice-president. Doctor George A. Dorsey was chosen secretary and Doctor W. P. Wilson treasurer. Councilors were elected as follows: To serve for three years—Doctor Richard Rathbun, of the United States National Museum; Professor E. S. Morse, of the Peabody Academy of Sciences, Salem, Mass.; to serve for two years—Doctor N. L. Britton, of the New York Botanical Garden; Professor J. E. Talmage, of the Deseret Museum, Salt Lake City; to serve for one year—Doctor F. A. Lucas and Doctor Wm. H. Goodyear, both of the Brooklyn Institute. The officers and the six councilors constitute the council of the Association, which formally assumed the name of "The American Association of Museums." A temporary constitution was adopted.

The gathering was declared by all who were present to be most successful, and it is doubtful whether any movement for the formation of an international association of this kind has ever been larger or more enthusiastic. A very gratifying feature was the receipt of a number of letters from the heads of museums in South America, giving in their adhesion to the movement. Several interesting papers were read and discussed.

The sessions of the second day were held at the Museum of the New York Botanical Garden, Bronx Park. The social features of the convention were the luncheon given by the Trus-

tees of the American Museum on the first day and that given by the Trustees of the New York Botanical Garden on the second day. The association adjourned to meet at the call of the council in the spring or early summer of 1907 at the Carnegie Museum in the city of Pittsburg.

MUSEUM NEWS NOTES.

AT the quarterly meeting of the Board of Trustees, held May 14, the following resolutions of thanks were adopted and elections announced.

To Mrs. William Earl Dodge, and her election as a Patron, in recognition of her gift of the "Willamette" meteorite;

To Mr. J. Pierpont Morgan, for his gift of the Warren Mastodon Collection;

To Mr. J. G. Phelps Stokes, and his election as a Patron, in recognition of his gift of ethnological material;

To Mrs. Frank K. Sturgis, and her election as a Fellow, for her contributions towards the purchase of Birds of Paradise;

To Mrs. Albert Bierstadt, and her election as a Fellow, in recognition of her gift of the painting entitled *The Landing of Columbus*, by her late husband;

To Professor C. F. Chandler, and his election as a Fellow, in recognition of his gift of the meteorite "Russel Gulch";

To the East Asiatic Committee for its donation of funds;

To the subscribers to the North American Ornithological Fund.

SOME important changes have been made in the Foyer. Specimens of several of the largest and most important meteorites known have been installed on pedestals around the room, the principal of which is Willamette, the 15½ ton iron from Oregon. Next, in point of size, is the 3-ton "Woman," and then the 1,100-pound "Dog," two members of the famous Peary group of three iron meteorites from Cape York, Greenland. Other falls illustrated here are Cañon Diablo, by a 1,087-pound mass

and one weighing 145 pounds; Long Island, the largest stone meteorite known, by two large and many small fragments; Forest City, a stone meteorite represented by a 75-pound mass, and Brenham, an iron-stone meteorite, represented by two large specimens, one of nickel-iron and the other of iron and stone. Tucson or the Signet Iron is represented by a full-size model in cast iron prepared from a model generously given to the Museum by the National Museum. The sections of the earth representing the North Polar and South Polar regions have been removed from the Foyer to the East Corridor where they have been hung upon the wall.

THE Jesup collection of the building stones of North America has been removed to a series of cases in the alcoves of the Hall of Forestry, where the improved conditions of light and installation render the specimens much more attractive than heretofore and more available for study.

MUCH progress has been made in the preparation of the models of the flowers, fruit and foliage of all the local native trees to be installed in connection with the Jesup Forestry Collection. When the local species have been represented the series of models will be extended as far as practicable to the other trees in the collection. These reproductions are all prepared direct from natural specimens, and, wherever possible, the natural object itself has been preserved and utilized in the model.

PROFESSOR BASHFORD DEAN, Honorary Curator of Fishes, has gone to Europe for three months, planning to remain most of the time in Germany. Here he will take the opportunity of making exchanges with collectors and museums, and he plans to make a number of purchases of specimens to fill in gaps in the exhibition series of fossil fishes. These purchases are rendered possible by a generous donation by a trustee of the Museum, Mr. Cleveland H. Dodge. Thanks to this fund it is now possible also to carry out a long-cherished plan to augment the collection of fossil fishes from a well-known American locality. To this end the curator's assistant, Mr. Louis Hussakof, aided by a graduate student of Columbia, Mr. Charles S. Mead, will be sent

on a collecting trip to the region of Scaumenac bay (Quebec), and from this classical locality it is hoped that they will secure many forms of the earliest fish-life of the American continent These important forms, it may be added, have hitherto been either misrepresented or very imperfectly represented in the Museum's collections. In the latter part of the season Mr. Hussakof will also visit several of the localities in Ohio, which yielded good results during the past season, and if time permits he will extend his trip to Iowa and Wisconsin in the further interest of the collections.

Two important collections of Mexican birds and mammals have recently been received from Mr. J. H. Batty, one made in the southern part of the State of Jalisco, the other in the State of Oaxaca. They contain many species not sent in his former collections. The birds include many large species, such as Hawks and Owls, Macaws, Parrots and the Mexican Turkey, and among the mammals are large series of Bats, Deer and various carnivores.

THE specimen of the great polar bear (*Thalarctas maritimus* (Phipps)) which was collected by Commander Robt. E. Peary at Payer Harbor, Greenland, in the spring of 1902 has been mounted at the Museum by Mr. James L. Clark and temporarily installed in the Main Hall of Mammals (No. 204, of the Second Floor). This magnificent specimen is a striking illustration of the advances which have been made within the past few years in the art of taxidermy. The animal is exhibited as if in the act of descending an iceberg.

THE Department of Ethnology has completed the first part of the installation illustrating the general features of the civilization of the Indians of the Great Plains. Some of the characteristics of these interesting tribes are: their almost complete dependence upon the flesh of the buffalo for food, the exclusive use of a tent made of buffalo skin stretched around a conical framework of poles, the very limited use of pottery, the great development of work in skins, the practice of the Sun Dance and the worship of the buffalo. The specimens in this exhibit

have been so selected and arranged as to demonstrate these characteristics. Each section of a case is devoted to a distinct phase of Plains life, and a label conveniently placed, states as briefly and concisely as possible, the facts pertaining to the specimens and their relation to the culture of an Indian tribe as a whole. As soon as practicable wall maps will be added to give the location of the principal tribes and their distribution throughout the area. This installation is the first step toward the re-arrangement of the halls of ethnology with the view to present systematically the general ethnography of North America.

Dr. Albert Ernest Jenks, formerly the Chief of the Ethnological Survey of the Philippine Islands, has been engaged in the cataloguing of the Philippine Ethnological collection, purchased at the St. Louis Exposition. Dr. Jenks is the chief authority upon the ethnology of the Philippines, and the Museum has been very fortunate in securing his services for this work. The collection now in the Museum is the largest and most complete Philippine collection in existence.

Mr. William Orchard recently made a visit to the site of the old Shinnecock Indian Reservation on Long Island and secured from one of the few survivors of that tribe the necessary information and assistance to construct an accurate model of the old type of grass-covered house used by these people. This model is now complete and will soon be installed with other material from the Shinnecock Indians. This house model is of special historical interest, because, as far as known, no other model, drawing or satisfactory description of this type of house has ever been made. A few years ago the Shinnecock were visited by Mr. R. M. Harrington, who secured a small collection containing practically all the ethnological specimens that existed.

A group exhibiting the Black Foot medicine pipe and accessories has been installed in the Hall of North American Indians, No. 102 of the Ground Floor. The exhibit is arranged to show the exact manner in which the pipe and its elaborate paraphernalia were placed for use in the ceremonies of the Black Foot.

Professor M. H. Saville sailed from New York in May on an archæological expedition, planned and financed by Mr. George G. Heye, into the northwestern portion of South America. After devoting some weeks to studies in Ecuador he will proceed northward into Colombia, where he will devote several weeks to the exploration of the Cauca Valley from Popayan to Antioquia. One of the objects of the study of this valley is to determine the origin of the peculiar black pottery which has been distributed therefrom to all the important museums of the world, but about which comparatively little is known.

Reproductions in plaster of the famous Okazaki Collection of Chinese bronzes and pottery have been completed and placed on exhibition in the Chinese Hall (No. 301 of the Third Floor).

Recent additions to the exhibits in the Hall of Invertebrates (No. 107 of the Ground Floor) include a series of models illustrating the development of the frog from the simple egg up to the tadpole stage, mounted specimens of the horned toad, and several lizards and tortoises and glass models of several Hydroids. A series of models illustrating the development of a coral in thirteen stages from the swimming larva as first set free from the parent polyp to the mature form has been installed in alcove No. 3. The Museum's magnificent specimen of the giant Gorgonia from the Japanese seas has been placed in a case at the north end of alcove No. 4. The specimens of the handsome Organ Pipe Coral have been rendered more interesting and instructive by the addition of reproductions of the animals to a portion of one of the specimens. The specimens of the great sponge, known as Neptune's Goblet, have been installed in a case by themselves at the end of alcove No. 2.

The New York Aquarium has presented to the Museum the body of a large striped bass, *Roccus lineatus*, which died January 13, 1906. The fish was collected in Gravesend Bay, Long Island, and placed in one of the salt-water pools of the Aquarium May 14, 1894, when it was 10 inches long and weighed half a pound. At death the fish was 29 inches long, $6\frac{3}{4}$ inches

high and $3\frac{3}{4}$ inches wide just back of the gills, and it weighed 10 pounds 4 ounces. The animal was in fair condition, but was not fat. If it had been fat, it would have weighed at least 15 pounds. Its food was herrings, minnows, shrimps and clams. The bass will be mounted for the Museum and a cast of it will be sent to the Aquarium. In the Aquarium there are several others of the same lot which are alive and in good condition. These fish have been in captivity longer than any others in this country, more than twelve years, and are of particular interest as showing growth during existence in an aquarium.

THE important Warren Collection noted in the JOURNAL for April has been received, and some of the specimens have been placed on exhibition in the Dinosaur Hall (No. 407 of the Fourth Floor). The new exhibit consists of several slabs from the Connecticut Valley Trias (Newark system) showing the footprints of many different kinds of dinosaurs, fossil mud-cracks, raindrop impressions and other features of the old estuary.

IMPORTANT advances have been made in the installation of the collection of fossil fishes, which may be found in the tower room opening off from the Dinosaur Hall on the Fourth Floor. The most striking feature of this series consists, probably, in the representations and restorations of the great armored fish, *Dinichthys*, from the Devonian rocks of Ohio. These so-called "fish" were of uncertain relations, but they must have been formidable denizens of the ancient seas on account of their great size (length, 20 feet) heavy armor and strong jaws and teeth. The armored fishes disappeared at the close of the Devonian, leaving no descendants which have survived to the present time. The sharks are illustrated in their phases of development from the primitive forms upward.

SAMUEL B. HOFFMAN, Esq., has generously provided funds for the continuation of the work of the Hoffman Ethnological Expedition in the Black Mountains of North Carolina, and the curator of the Department of Entomology, Mr. W. Beutenmüller, is now in the field collecting.

AUGUSTUS L. CLARKSON has given the Museum a collection of insect architecture and the entomological library formed by his brother, the late Frederick Clarkson. The collection consists of two large cases containing a popular display of the well-known insects, their homes, food and, to some extent, their life history. These cases have been installed beside the entrance of the Hall of Entomology (No. 307 of the Third Floor).

THE observation hive of the Honey Bee has been placed in position in the hall of Entomology (No. 307 of the Third Floor), and its occupants may be watched at their honey making every day.

THE Department of Conchology has received from C. D. Guyer some well-prepared specimens of the local molluscan fauna. The specimens include exquisitely cleaned individuals of *Petricola pholadiformis*, Lam., and *Pholas tunicata*, Say, both taken at Barren Island, in crowded colonies, in hard resistant submerged turf beds. From the Bronx River and from the lake in Prospect Park, Brooklyn, Mr. Guyer obtained large and living examples of *Unio* and *Anodonta*. *Ensatella americana* Gould, in perfect condition, with uninjured epidermis, was also received from Long Island, through the same collector. The *Pholas* showed the supplementary valves uninjured; and the *Petricola* which, unless carefully treated, will so compress its valves as to crack and disfigure them, was also perfect.

THE Bruce Fund continues to augment the mineral collection, and in the last few months has added some interesting Silvers from Cobalt, Ontario, Canada, among which are the curious antimonial bodies, which seem to grade into true Dyscrasite on the one hand, and into pure Silvers on the other. Together with these was obtained a remarkable specimen showing a veinlet of native Bismuth between walls of calcite.

A STRIKING Silver from Lake Superior, Michigan, associated with Copper, Calcite and Epidote, is quite unlike the other Silvers in the collections from the same region, being composed of rough and twisted sheets implanted in the rock and rising from it in broken foliæ.

DUMORTIERITE from southern California, recently made the subject of a study by Doctor Schaller of the U. S. Geological Survey, Bröggerite, Malacon and Heulandite from Norway, and an exchange specimen of Riebeckite from the well-known collector, Walter F. Ferrier, are among the more important mineral accessions.

A NOBLE group of extraordinarily large and perfect pink Beryls associated with pink and green Tourmaline crystals has been added to the Gem Collection. The specimen is from the famous locality near Pala, San Diego County, California, which has furnished the world with the gem Kunzite in addition to gem Tourmalines and Beryls.

THE reptiles which have been exhibited for a long time in the Mammal Hall on the Third Floor in the central portion of the building (No. 304) have been removed to their new position in the East Mammal Hall (No. 207) of the Second Floor, where all the reptiles and reptile groups have been assembled for temporary exhibition.

THE west stairway between the Second and Third Floors is now devoted to the exhibition of the principal part of the Museum's collection of Audubboniana. The portrait of the famous naturalist together with some of his oil-paintings, water-colors, sketches, original plates of the elephant folio edition, his clothing and gun have been installed so that they may be readily seen and examined by those interested in Audubon and his work.

NEWS comes that the Tjader Expedition into British East Africa reached the end of their railway journey in safety, and that a company of fifty-three Zulus have been engaged for the journey on foot through the forest. While on the railway journey to Nairobi Mr. Tjader secured a fine lion, two Thomas's gazelles and three hartbeests. Zebras by the hundred, gazelles in immense herds and many hartbeests were seen from the car window.

THE lectures to school children from January 1 to June 1 were attended by 17,184 pupils from the public schools.

ERRATA.

The Editor regrets the occurrence of the following errors in the Guide to the Local Collection of Birds, which of necessity was printed in the absence of the author:

Page 85, line 39 for Woodcocks read Woodcock.
" 88, " 7 " Black Gyrfalcon ? read Gyrfalcon.
" 90, " 6 " White Gyrfalcon " Black Gyrfalcon.
" 138, " 5 " *Iherminieri* " *I'herminieri.*
" 143, " 1 " *albiferons* " *albifrons.*
" 143, " 28 " *Gura* " *Guara.*
" 145, " 1 " *Colurnicops* " *Coturnicops.*
" 145, " 5, omit "See group, third floor."
" 149, " 37 for Kildeer read Killdeer.
" 150, " 14 " *pallitus* " *palliatus.*
" 152, " 14 " Swaison's " Swainson's.
" 152, " 27 " *Haliætus* " *Haliæetus.*
" 159. " 21 " Family ALCEDINIDÆ. Kingfishers read — Family PICIDÆ. Woodpeckers.
" 175, " 11 for *Progue* read *Progne.*
" 179, " 40 " *domina* " *dominica.*
" 183, " 11 " *Opornis* " *Oporornis.*
" 184, " 11 " *Steophaga* " *Setophaga.*
" 187, " 25 " *mustelina* " *mustelina.*
" 188, " 8 " *Hylocichla bicknelli* read *Hylocichla aliciæ bicknelli.*

Prefix the asterisk [*], indicating occurrence in Central Park, to the following species:

Screech Owl,
Northern Water-Thrush,
Louisiana Water-Thrush,
Yellow-breasted Chat,
Wilson's Thrush,
Gray-cheeked Thrush,
Olive-backed Thrush,
Hermit Thrush,
American Robin,
Bluebird.

List of Birds Found Within Fifty Miles of the American Museum of Natural History, New York City.[1]

Order PYGOPODES. Diving Birds.

Family COLYMBIDÆ. Grebes.

Holbœll's Grebe (*Colymbus Holbœlli*). A rather uncommon spring and fall migrant and less common winter resident.

Horned Grebe (*Colymbus auritus*). A common spring and fall migrant and not uncommon winter resident.

***Pied-billed Grebe; Diedapper; Dabchick; Hell Diver** (*Podilymbus podiceps*). Occurs chiefly as a migrant. In northern New Jersey and the Lower Hudson Valley it is common, but on Long Island is of "comparatively rare and infrequent occurrence" (Dutcher, MS). During favorable seasons a few pass the winter here. I know of no definite instance of its breeding. (See group, second floor of Museum).

Family GAVIIDÆ. Loons.

Loon (*Gavia imber*). A common migrant and less common winter resident. (See group, second floor).

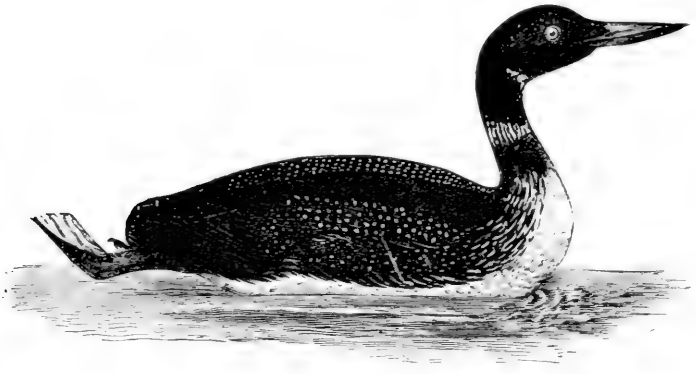


Fig. 1. Loon.

Black-throated Loon (*Gavia arctica*). Breeds in the far north, migrating southward to southern Canada. The only record of its occurrence near New York is based on an adult male (Coll. Am. Mus. No. 64,610) taken April 29, 1893, between Sands Point and Execution Lighthouse, L. I. (Dutcher, Auk, X, 1893, p. 265).

Red-throated Loon (*Gavia lumme*). A not uncommon winter resident, but more frequently found during the migrations.

[1] Issued also in separate form as **Guide Leaflet, No. 22.**

FAMILY ALCIDÆ. AUKS, MURRES AND PUFFINS.

Puffin (*Fratercula arctica*). There is but one recent record of its occurrence, December 15, 1882, Center Moriches, L. I. (Dutcher, Auk, V, 1888, p. 171).

Black Guillemot (*Cepphus grylle*). Breeds from the Bay of Fundy northward; in winter migrates southward, regularly to Massachusetts. It has been found but once in Connecticut (Stony Creek, Dec. 1887.—Sage, Auk, VII, 1890, p. 283), and the only Long Island record, given by Lawrence, is apparently based on a specimen in the Lawrence Collection labeled "Long Island" (Coll. Am. Mus. No. 64,614).

Brünnich's Murre (*Uria lomvia*). Breeds from the Magdalen Islands northward; in winter migrates southward as far as New Jersey. On the western end of Long Island it is as a rule uncommon; at the eastern end it occurs more frequently, but is irregular (Dutcher, Auk, II, 1885, p. 38). During some seasons, however, the bird becomes common in our waters (Averill, Auk, VIII, 1891, p. 307). Giraud's record of "*Uria troile*" doubtless refers to this species. Specimens in the Lawrence Collection originally labeled "*U. troile*" are *U. lomvia*. Records of the occurrence of this species on Long Island during the winter are given by Braislin (Auk, XX, 1903, p. 51).

Razor-billed Auk (*Alca torda*). Breeds from the Magdalen Islands northward; in winter migrates southward, regularly to Long Island and rarely to Virginia and North Carolina.

Dovekie (*Alle alle*). A species of the far north, migrating southward in winter, more or less regularly to New Jersey. With us its numbers vary during different winters. It is considered by Dutcher to be generally a rare bird on Long Island (Abst. Linn. Soc. No. 4, 1892, p. 6), but is given by Scott as a regular winter visitant on the New Jersey coast (Bull. Nutt. Orn. Club, IV, 1879, p. 228).

ORDER LONGIPENNES. LONG-WINGED SWIMMERS.

FAMILY STERCORARIIDÆ. SKUAS AND JÆGERS.

Pomarine Jæger (*Stercorarius pomarinus*). Passes the nesting season chiefly within the Arctic Circle and migrates southward from July to late October, during which period it is sometimes not uncommon off our coast, its presence depending largely on the abundance of the small fish on which it feeds (Baird, Auk, IV, 1887, p. 71).

Parasitic Jæger (*Stercorarius parasiticus*). Occurs off the coast in this vicinity as a regular migrant with the preceding species.

Long-tailed Jæger (*Stercorarius longicaudus*). During its migration it is sometimes not uncommon off our coast.

FAMILY LARIDÆ. GULLS AND TERNS.

Ivory Gull (*Pagophila alba*). A boreal species of which there appears to be but one record, that of an adult taken at Sayville, L. I., January 5, 1893 (Dutcher, Auk, XII, 1895, p. 200).

Kittiwake Gull (*Rissa tridactyla*). A common late fall transient visitant and a comparatively rare winter resident, occuring generally some distance off-shore (Dutcher, MS).

Glaucous Gull; Burgomaster (*Larus glaucus*). Several specimens have been killed on the Lower Hudson River, and off Long Island it is found regularly in small numbers (Dutcher, MS).

Iceland Gull (*Larus leucopterus*). A northern species of which but one valid record exists for this vicinity, Rye, N. Y. March 3, 1894 (Porter, Auk, XII, 1895, p. 76; see also Dwight, Auk, XXIII, 1906, p. 37, where a second specimen reported by Porter, and incorrectly recorded by Chapman as *leucopterus*, is given as *L. kumlieni*).

Kumlien Gull (*Larus kumlieni*). There are two records of this rare Gull for this vicinity, one is based on an immature male shot March 8, 1898, at Rockaway Beach, L. I. (Braislin, Auk, XVI, 1899, p. 190 and XXII, 1905, p. 168, where the specimen is definitely identified), the other an immature female taken February 16, 1894, at Stamford, Conn. (Porter, Auk, 1895, p. 76; see also Dwight, Auk, XXIII, 1906, p. 37, where this specimen incorrectly identified by Chapman is re-determined).

Great Black-backed Gull (*Larus marinus*). A regular winter resident not uncommon along the coast, but rarely ascending our rivers.

***Herring Gull** (*Larus argentatus*). This is the common winter Gull of our harbor and coast. It arrives from the north in September and is abundant until April. The adults are pearl gray; the immature birds, or young born the previous summer, are grayish brown. There has been an evident increase in the numbers of this species since certain of its breeding grounds have been protected. Braislin states that non-breeding birds are now common on the south shore of Long Island during the summer (Auk, XXII, 1905, p. 168).

Ring-billed Gull (*Larus delawarensis*). A rather uncommon spring and fall migrant and winter resident (Dutcher, MS). Braislin (Auk, XXII, 1905, p. 168) states that this species is not uncommon on Long Island in the summer, that it occurs in large numbers in October, but that he has no record later than November 17.

Laughing Gull (*Larus atricilla*). Formerly a common summer resident on Long Island, but now known to nest only on Great South Bay, where it is rare. (See group, second floor).

Bonaparte's Gull (*Larus philadelphia*). A regular spring and fall migrant, sometimes seen in winter.

Little Gull (*Larus minutus*). This is a European species; the only satisfactory records of its occurrence in North America are those of immature birds taken on Fire Island, Long Island, September 15, 1887 (Dutcher, Auk, V, 1888, p. 172), and Rockaway Beach, L. I., May 10, 1902 (Braislin, Auk, XX, 1903, p. 52).

Sabine's Gull (*Xema sabinii*). A circumpolar species breeding in the Far North and rarely coming as far south as northern United States. Giraud records a specimen shot at Raynor South, Long Island, "July, 1837."

Gull-billed Tern (*Gelochelidon nilotica*). A southern species breeding as far north as Virginia, and wandering occasionally to Maine. There are several Long Island records, the most recent being two specimens taken at South Oyster Bay, July 4, 1882 (Dutcher, Auk, I, 1884, p. 34), and one shot from a flock of five on Shinnecock Bay, July 8, 1884 (Dutcher, Auk, II, 1885, p. 38).

Caspian Tern (*Sterna caspia*). A rather uncommon fall migrant. There appears to be but one spring record, that of two adult males taken at Amityville, L. I., May 12, 1898 (Braislin, Auk, XVI, 1899, p. 191).

Royal Tern (*Sterna maxima*). There is but one instance of its occurrence on Long Island, a specimen taken at Raynor South, August 27, 1831, by J. F. Ward (Am. Mus. No. 46,008, Lawrence Coll.).

Forster's Tern (*Sterna Forsteri*). More common in the interior than on the Atlantic coast, where it is not known to breed north of Virginia. It wanders irregularly northward and is sometimes found in this vicinity.

Common Tern; Sea Swallow (*Sterna hirundo*). Inhabits the greater part of the Northern Hemisphere; in North America breeds locally from the Arctic regions to the Gulf of Mexico. This was formerly an abundant bird along our coasts, but the relentless persecutions of millinery collectors have so reduced its numbers that it is now found in only a few isolated localities. Not many years ago it bred more or less commonly all along the Long Island coast, but until recently almost the only surviving large colony inhabited Big Gull Island. Even in this remote locality it was constantly persecuted by nest-robbing fishermen and egg collectors. Through the efforts of a number of bird-lovers, who raised a sum of money for the purpose, permission was obtained from the Lighthouse Board to have the lightkeeper on Little Gull Island appointed a special game-keeper to protect the Terns on Big Gull Island. The birds rapidly increased under this guardianship, but the subsequent use, by the United States Government, of Gull Island for the erection of fortifications has caused the Terns to abandon it. Colonies are now found at both the northern and southern ends of Gardiner's Island.

Roseate Tern (*Sterna dougalli*). "Temperate and tropical regions." In north America formerly breeding along the Atlantic coast northward irregularly to Maine; now rare north of southern New Jersey. A few pairs lived on Big Gull Island with the colony of Common Terns above mentioned, but I have not observed the species in either of the Gardiner's Island colonies.

The Arctic Tern (*Sterna paradisæa*) is included by Lawrence without remark. I know of no record of its occurrence near New York City, and Mr. Dutcher has but one specimen from Long Island, a male taken on Ram Island Shoals, July 1, 1884.

Least Tern (*Sterna antillarum*). Formerly a common summer resident in suitable places on the coasts in this vicinity, but now occurs only as a rare migrant.

Sooty Tern (*Sterna fuliginosa*). A southern species, not breeding north of North Carolina, but occasionally straying farther up the coast. It has been recorded from Lake Ronkonkoma, L. I. (Dutcher, Auk, III, 1886, p. 433), and Highland Falls, N. Y. (Mearns, Bull. Essex. Inst. XII, 1879, 87).

Black Tern (*Hydrochelidon nigra surinamensis*). A species of the interior, breeding from Kansas and Illinois to Alaska. Occurs on the Atlantic coast as an irregular migrant, usually in the fall, sometimes in considerable numbers.

FIG. 2. TERN.

FAMILY RYNCHOPIDÆ. SKIMMERS.

Black Skimmer (*Rynchops nigra*). A southern species, not breeding north of Maryland, but occasionally wandering up the coast after the breeding season. There are several records of its occurrence on Long Island during the summer.

ORDER TUBINARES. TUBE-NOSED SWIMMERS.

FAMILY PROCELLARIIDÆ. FULMARS AND SHEARWATERS.

Fulmar (*Fulmarus glacialis*). An arctic species which sometimes wanders southward to Massachusetts. One was found in an exhausted condition at Ridgewood, New Jersey, December, 1892, after a storm (Hales, Orn. and Oöl., XVII, 1892, p. 39).

Cory's Shearwater (*Puffinus borealis*). A pelagic species, sometimes not uncommon off our coasts from August to November. It has been recorded from Amagansett (Dutcher, Auk, V, 1888, p. 5), to Cape Cod, Massachusetts, but doubtless occurs along our coast to the southward. Braislin records two specimens shot off Fire Island Inlet, October 4, 1902 (Auk, XXI, 1904, p. 287).

Greater Shearwater (*Puffinus gravis*). A pelagic species, found on the Atlantic Ocean from Cape Horn to Greenland. Its breeding place is unknown. It appears off our coasts in early June and is irregularly common until November.

Audubon's Shearwater (*Puffinus Iherminieri*). A southern species, breeding in the Bahamas and Bermudas, and rarely wandering northward to Long Island (Dutcher, Auk, V, 1888, p. 173).

Sooty Shearwater (*Puffinus griseus*). Known from the North Atlantic southward to South Carolina. It is found off our coasts associated with the Greater Shearwater, but is much less common.

The Stormy Petrel (*Procellaria pelagica*) is included by Lawrence in his "Catalogue of Birds Observed on New York Island" etc., but the record is not accompanied by data, nor is there a specimen of the bird from this vicinity in the Lawrence Collection.

Leach's Petrel (*Oceanodroma leucorhoa*). Breeds from Maine northward, and in the winter ranges southward to Virginia. It is rather uncommon in this vicinity.

Wilson's Petrel (*Oceanites oceanicus*). Nests in the islands of the Southern Seas (Kerguelen Island) in January and February and migrates northward after the breeding season, reaching the waters of our coasts in May and remaining until late September. It sometimes enters the Lower Bay of New York harbor in numbers.

FIG. 3. PETREL.

ORDER STEGANOPODES. TOTIPALMATE SWIMMERS.

FAMILY SULIDÆ. GANNETS.

Booby (*Sula leucogaster*). Coasts and islands of tropical and sub-tropical America, north of Georgia. Accidental on Moriches Bay, L. I. (Dutcher, Auk, X, 1893, p. 270).

Gannet (*Sula bassana*). A spring and fall migrant, usually occurring well off shore.

FAMILY PHALACROCORACIDÆ. CORMORANTS.

Cormorant (*Phalacrorcorax carbo*). It is not common south of Maine, and is rare in this vicinity.

Double-crested Cormorant (*Phalacrocorax auritus*). A common spring and fall migrant.

FAMILY PELECANIDÆ. PELICANS

White Pelican (*Pelecanus erythrorhynchos*). Now rare or accidental on the Atlantic coast. Two specimens have been taken in this vicinity, one at Canarsie Bay, L. I. (Dutcher, Auk, X, 1893, p. 270), the other, a male, at Roslyn, May 11, 1885 (Forest and Stream, XXIV, 1885, p. 328).

Brown Pelican (*Pelecanus occidentalis*). Breeds as far north as South Carolina and occasionally strays up the coast as far as Massachusetts. DeKay records a specimen from Sandy Hook.

ORDER ANSERES. LAMELLIROSTRAL SWIMMERS.

FAMILY ANATIDÆ. DUCKS, GEESE AND SWANS.

American Merganser; Shelldrake (*Merganser americanus*). Not common from November to April.

Red-breasted Merganser; Shelldrake (*Merganser serrator*). On Long Island it is a very common spring and fall migrant (Dutcher, MS).

Hooded Merganser (*Lophodytes cucullatus*). A not common migrant and occasional winter visitant.

Mallard (*Anas boschas*). An irregular transient visitant, occurring in spring, winter and fall.

***Black Duck** (*Anas obscura*). Breeds from New Jersey to Labrador and winters from Massachusetts southward. It formerly nested in this vicinity, but now is found chiefly as a migrant, and less commonly in the winter. It still nests at some points on the Jersey coast and in a few localities on Long Island, (Dutcher, MS). (See group, second floor).

The Red-legged Black Duck, a supposed race of the Black Duck has been recorded from Long Island by Braislin (Auk, XXI, 288), but the status of this form is as yet too unsettled to make it desirable definitely to introduce it here.

Gadwall (*Chaulelasmus streperus*). A very rare migrant in this vicinity.

European Widgeon (*Marcca penelope*). An Old World species which occurs rarely on our coast. It has been taken at Leonia, N. J. (Chapman, Auk, VI, 1889, p. 302).

Baldpate; American Widgeon (*Marecca americana*). An irregular transient visitant.

European Green-winged Teal (*Nettion crecca*). An Old World species of rare occurrence on our coasts. It is recorded from Trenton, N. J. (Abbott, Geology of New Jersey, 1868, p. 792), Hartford, Conn. (Treat, Auk, VIII, 1891, p. 112), and from Merrick, L. I., where two specimens were captured in December, 1900 (Braislin, Auk, XIX, 1902, p. 145).

Green-winged Teal (*Nettion carolinensis*). A rather uncommon spring and fall migrant and winter resident.

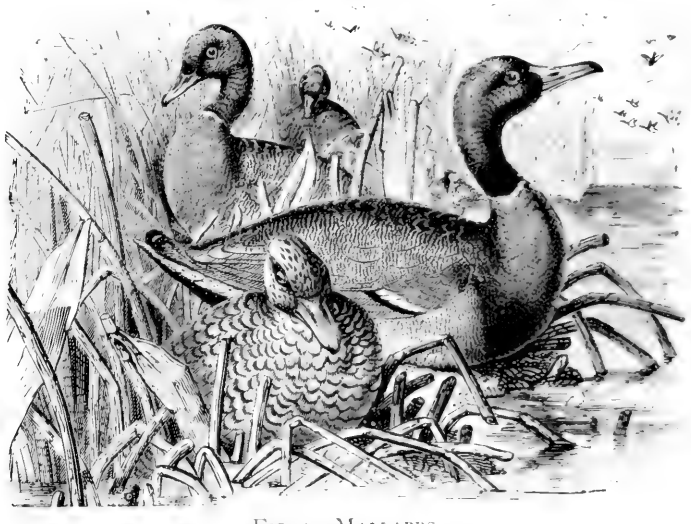


FIG. 4. MALLARDS.

Blue-winged Teal (*Querquedula discors*). A not common spring and common fall migrant.

Shoveller; Spoonbill (*Spatula clypeata*). A rare and irregular transient visitant.

Pintail; Sprigtail (*Dafila acuta*). A common migrant.

***Wood Duck; Summer Duck** (*Aix sponsa*). The Wood Duck is a rare summer resident on some of our more retired, wooded streams and becomes more common during the migrations.

The Rufous-crested Duck (*Netta rufina*) is an Old World species which is known as North American only from one specimen found in Fulton Market, New York City, and supposed to have been shot on Long Island.

Redhead (*Aythya americana*). On Long Island this species occurs as a regular migrant, in varying numbers, and is occasionally found in the winter (Dutcher, MS).

Canvasback (*Aythya vallisneria*). Occurs here as a not common migrant.

American Scaup Duck; Broad-bill; Blue-bill; Black-head; Raft Duck (*Aythya marila*). The commonest Duck of our bays, where it is sometimes seen in great numbers. It appears from the north about October 1 and remains until its feeding grounds are frozen over, returning as soon as the ice breaks in the early spring.

Lesser Scaup Duck; Little Blue-bill; Creek Broadbill; Raft Duck (*Aythya affinis*). Not as common as the preceding, with which its range in the main agrees.

Ring-necked Duck (*Aythya collaris*). North America, breeding only in the interior from Iowa northward. It is here a very rare, irregular transient visitant. The last record is that of Braislin (Auk, XVI, 1899, p. 191) who mentions a specimen from Great South Bay.

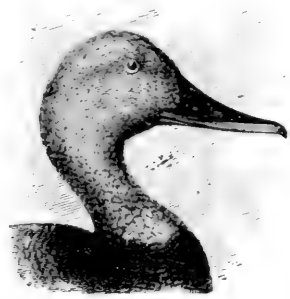


FIG. 5. CANVAS-BACK.

FIG. 6. REDHEAD.

American Golden-eye; Whistler (*Clangula clangula americana*). In favorable localities within our limits the Whistler is a not common migrant and winter resident.

Bufflehead; Butterball (*Charitonetta albeola*). A not uncommon migrant and winter resident.

Old-squaw; Old-wife; South-southerly (*Harelda hyemalis*). A common winter resident.

Harlequin Duck (*Histrionicus histrionicus*). Breeds from Newfoundland northward, and winters southward to New Jersey. A very rare winter visitant off our coast (Dutcher, Auk, III, 1886, p. 434; VI, 1889, p. 134).

The Labrador Duck (*Camptolaimus labradorius*), which formerly inhabited the Atlantic Coast, breeding from Labrador northward and wintering southward to New Jersey, is doubtless now extinct. The Labrador Duck was apparently once a not uncommon winter bird on Long Island. In a paper by William Dutcher (Auk, VIII, 1891, p. 201; see also Auk, XI, 1894, pp. 41, 175, 176.) summarizing our knowledge of its life-history and enumerating the extant specimens, Mr. George N. Lawrence is quoted as saying: "I recollect that about

forty or more years ago it was not unusual to see them in Fulton Market, and without doubt they were killed on Long Island; at one time I remember six fine males, which hung in the market until spoiled for want of a purchaser." Only forty-two of these Ducks have been recorded as existing in collections. Of this number seven are in the American Museum. (See group, second floor).

American Eider (*Somateria dresseri*). A rare winter visitant.

King Eider (*Somateria spectabilis*). Breeds from Labrador to the Arctic Regions, migrating southward regularly as far as eastern Long Island (Dutcher, Auk, V, 1888, p. 175).

American Scoter; Black Coot (*Oidemia americana*). A more or less common migrant and winter resident.

White-winged Scoter; White-winged Coot (*Oidemia deglandi*). A common migrant and winter visitant off our coasts.

Surf Scoter (*Oidemia perspicillata*). Found here with the preceding species.

Ruddy Duck (*Erismatura jamaicensis*). A not uncommon migrant, occurring in varying numbers.

Greater Snow Goose (*Chen hyperborea nivalis*). An irregular transient visitant.

Fig. 7. Canada Goose.

American White-fronted Goose (*Anser. albifrons. gambeli*). North America, breeding far northward; in winter, south to Mexico and Cuba. Rare on the Atlantic Coast. It has been recorded on Long Island from Babylon (Giraud), Great South Bay Islip and Montauk (Dutcher, Auk, X, 1893, p. 271).

***Canada Goose** (*Branta canadensis*). A common migrant, appearing in November and remaining until our bays are frozen. In the spring the last birds pass on their northward journey as late as early May.

Hutchins's Goose (*Branta Canadensis hutchinsi*). A rare migrant in this vicinity.

White-bellied Brant (*Branta bernicla glaucogaster*). A common bird, appearing from the north in October and remaining until our bays are frozen, when it retreats farther southward. In April it returns, and the migration is not concluded until May.

Black Brant (*Branta nigricans*). This is a western species which is occasionally found on our coasts. It has been recorded from Egg Harbor, N. J. (Lawrence), Babylon and Islip, L. I. (Dutcher, Auk, 1893, pp. 266, 271).

Barnacle Goose (*Branta leucopsis*). An Old World species, occurring accidentally on our coasts. A specimen was killed on Jamaica Bay, L. I., in October, 1876 (Lawrence, Bull. Nutt. Orn. Club, II, 1877, p. 18).

Whistling Swan (*Olor Columbianus*). Breeds in the far north, and winters as far south as the Gulf of Mexico. It is an exceedingly rare bird on the Atlantic coast north of the Chesapeake. A recent record is that of a bird killed at Flatlands, L. I., within the limits of Greater New York, on Dec. 24, 1901. (Braislin, Auk, XX, 1903, p. 52).

Order HERODIONES. Herons, Storks, Ibises, etc.

Family IBIDIDÆ. Ibises.

White Ibis (*Gura alba*). A bird of the Southern States, which has been recorded twice from this vicinity (Raynor South and Moriches, L. I., Giraud).

Glossy Ibis (*Plegadis autumnalis*). An Old World species of "irregular distribution in America." It has been recorded once from Southampton L. I., and once from Canarsie Bay, L. I. (Dutcher, Auk, X, 1893, p. 271).

Family ARDEIDÆ. Herons, Egrets, Bitterns, etc.

***American Bittern** (*Botaurus lentiginosus*). "Temperate North America, south to Guatemala and the West Indies"; breeds but rarely south of Virginia. In this vicinity it is not common during the summer.

Least Bittern (*Ardetta exilis*). A locally common summer resident.

Great Blue Heron (*Ardea herodias*). With us it is a common migrant, and is probably found as a summer resident in a few localities. It is generally known by the name of "Crane."

American Egret (*Herodias egretta*). A southern species, breeding as far north as Virginia, and after the breeding season wandering northward in small numbers. It is here a rare and irregular summer visitant, occurring between August 1 and the last of September (Dutcher, Auk, X, 1884, p. 32). Comparatively recent records of the occurrence of this species are those of Braislin (Auk, XVII, 1900, p. 69; XIX, 1902, p. 145) and Owen (Auk, XV, 1898, p. 51).

Snowy Heron (*Egretta candidissima*). One of three individuals seen near Sayville, L. I., May 30, 1885, by William Dutcher and L. S. Foster was "carrying a long stick in its bill" (Dutcher, Auk, III, 1886, p. 435), and possibly was preparing to breed. Now an exceedingly rare bird breeding in a few isolated localities in Florida. Birds identified in life as this species are more apt to be the young of the Little Blue Heron (Braislin, Auk, XIX, 1902, p. 145).

Little Blue Heron (*Florida cærulea*). This southern species, like the preceding, wanders northward in small numbers after the breeding season, and a few are sometimes found near New York. (See group, second floor).

***Green Heron** (*Butorides virescens*). One of our commonest Herons and known under a great variety of names. It haunts the banks of streams and ponds and places its nest of sticks in a bush or the lower branch of a tree.

***Black-crowned Night Heron**; **Quawk** (*Nycticorax nycticorax nævius*). A locally common summer resident. There is a colony containing about 500 pairs not far from New York City. The popular name "Quawk," is derived from the call of the bird.

Yellow-crowned Night Heron (*Nyctanassa violacea*). Breeds from South Carolina southward and occasionally strays up the coast as far as Massachusetts. There is but one definite record for this region, that of a specimen taken in April, near Freeport, Queens County, L. I. (Dutcher, Auk, X, 1893, p. 286).

Order PALUDICOLÆ. Cranes, Rails, etc.

Family RALLIDÆ. Rails, Gallinules and Coots.

King Rail (*Rallus elegans*). Breeds as far north as Connecticut and has been known to stray to Maine. It is a rare summer resident of our fresh-water marshes (Dutcher, Auk, V, 1888, p. 176).

Clapper Rail; **Meadow Hen**; **Marsh Hen** (*Rallus crepitans*). This is an exceedingly common summer resident of the salt marshes of our coasts. Occasionally it winters in our region. (See group, second floor).

Virginia Rail (*Rallus virginianus*). A locally common summer resident, a few remaining during the winter.

Sora; **Carolina Rail**; **Rail-bird** (*Porzana carolina*). A rare summer resident in this vicinity, but in the fall it becomes common, feeding on wild rice of our marshes where, however, it is yearly becoming less numerous.

Yellow Rail (*Colurnicops noveboracensis*). Little is known about the nesting habits of this bird. It haunts grassy marshes and seeks safety by hiding or running, and for this reason is rarely seen. Several have been taken during the fall migration in this vicinity, and it is doubtless more common than is generally supposed. (See group, third floor.)

Black Rail (*Creciscus jamaicensis*). This bird, though much rarer, has as far as known the same habits as the preceding species and like it is very difficult to observe. It has been taken in the spring at Jamaica Bay and doubtless breeds in this vicinity, since its nest has been found at Saybrook, Conn. (Clarke, Auk, I, 1884, p. 394). (See group, third floor).

Corn Crake (*Crex crex*). This is an Old World species which sometimes strays to Greenland and our Atlantic coast. In this region there are records for Sag Harbor, L. I. (Dutcher, Auk, III, 1886, p. 435), Oakdale, L. I. (Dutcher, Auk, V, 1888, p. 177), and Saybrook, Conn. (Clark, Orn. and Oöl., XIII, 1888, p. 45).

Purple Gallinule (*Ionornis martinica*). Tropical America, breeding as far north as South Carolina, and straying casually to Maine. There are but two definite records for this region, Middle Island, L. I. (Helme, Orn. and Oöl., VII, 1882, p. 118) and Indian Pond, near Flatlands, L. I. (Dutcher, Auk, X, 1893, p. 272).

Florida Gallinule (*Gallinula galeata*). Temperate and tropical America, breedng as far north as Maine, and wintering from Florida southward. It breeds only locally in the northeastern part of its range, frequenting the borders of ponds or streams surrounded by marshy grounds. Its nest has not been found in the immediate vicinity of New York City, where it is known only as a rare migrant.

***Coot**; **Mud-hen**; **Crow-duck** (*Fulica americana*). The Mud-hen is a not uncommon bird during migration, but it is recorded as breeding only near Morristown, N. J. (Thurber, True Democratic Banner, newspaper, Nov. 10, 1887).

Order LIMOCOLÆ. Shore Birds.

Family PHALAROPODIDÆ. Phalaropes.

Red Phalarope (*Crymophilus fulicarius*). The Phalaropes are pelagic birds, not often coming to our coasts unless driven shoreward by storms. There are both August and May records for this species on Long Island.

Northern Phalarope (*Phalaropus lobatus*). This bird occurs with us as a regular migrant, and after severe storms it is sometimes common in flocks. (Dutcher, Auk, 1884, p. 33).

Wilson's Phalarope (*Steganopus tricolor*). Interior of North America, breeding from northern Illinois northward. With us it is a very rare and irregular migrant.

FAMILY RECURVIROSTRIDÆ. AVOCETS AND STILTS.

American Avocet (*Recurvirostra americana*). A bird of the interior, breeding from Texas to the Saskatchewan. Giraud mentions it as casual on Long Island, and says that a few bred at Egg Harbor, N. J. (Dutcher records four individuals seen by Col. Nicholas Pike on Long Island as follows: Ponquogue, 1844; Canarsie Bay, 1847; Southampton, two, no date (Auk, X, 1893, p. 272).

Black-necked Stilt (*Himantopus mexicanus*). A southern species, breeding in the Gulf States and locally in the Mississippi Valley and westward; rare on the North Atlantic coast. Giraud mentions it as "unfrequent," and Dutcher records two specimens taken by Colonel Pike on Great South Bay, one of them in 1843 (Auk, X, 1893, p. 272).

FAMILY SCOLOPACIDÆ. SNIPES, SANDPIPERS, ETC.

European Woodcock (*Scolopax rusticola*). The only record for the occurrence of this species in this vicinity is based on a specimen found in Washington Market, December 6, 1859, which was said to have been killed near Shrewsbury, N. J. (Lawrence, Ann. Lyc. Nat. Hist., VIII, 1866, p. 223).

***Woodcock** (*Philohela minor*). The woodcock is a not uncommon summer resident and more numerous fall migrant. Owing to the clearing of timber areas, draining of lands and demands of sportsmen, it is however, yearly decreasing in numbers in the vicinity of New York. It arrives early in March, and does not leave us until the ground is frozen. (See group, second floor).

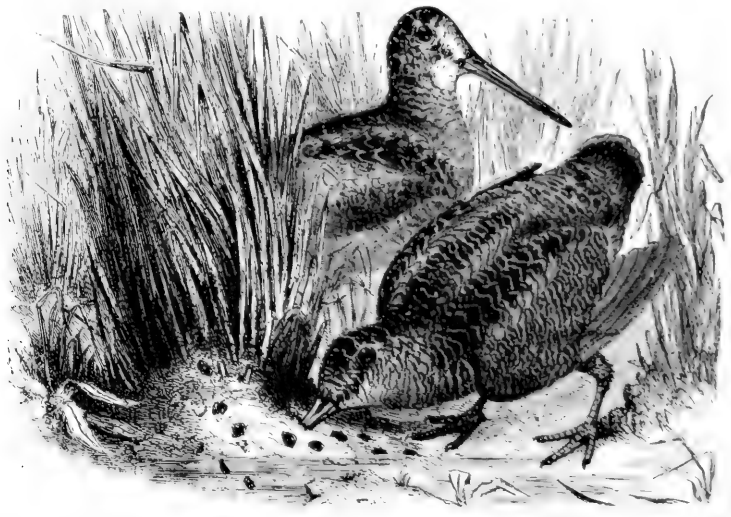


FIG. 8. WOODCOCK.

Wilson's Snipe; English Snipe (*Gallinago delicata*). A not uncommon migrant, and crippled birds are said to have nested on several occasions near Chatham, N. J. (Herrick, Forest and Stream, XII, 1879, p. 165). During mild seasons a few pass the winter here (Dutcher, MS).

Dowitcher (*Macrorhamphus griseus*). A common migrant, arriving from the south about May 1 and returning from the north between July 10 and August 15.

Migrating Snipe, Sandpipers and Plovers fly, as a rule, some distance off the land and if the weather is calm and clear, very few birds are found on our shores. If, however, during their migrations storms from the right quarter, or fogs occur, many birds are driven shoreward and there results what among sportsmen is known as a "flight."

Long-billed Dowitcher (*Macrorhamphus scolopaceus*). This western representative of our common Dowitcher is a rare but regular late fall migrant along the Atlantic coast.

Stilt Sandpiper (*Micropalama himantopus*). A not common but by no means rare migrant, occurring chiefly during the fall migration from the middle of July to the middle of September.

Knot; Robin Snipe (*Tringa canutus*). A common migrant, passing northward during May and returning from the middle of July to the first of October.

Purple Sandpiper (*Arquatella maritima*). A rare but regular winter resident.

Pectoral Sandpiper; Krieker (*Actodromas maculata*). A common and sometimes abundant fall migrant in this vicinity; less frequently seen in the spring. It returns from the north in early August, and its migration is concluded about the last of October.

White-rumped Sandpiper (*Actodromas fuscicollis*). A not uncommon spring and fall migrant.

Baird's Sandpiper (*Actodromas bairdi*). Casual on the Atlantic coast. There are several records for this vicinity, as follows: Rockaway, L. I., August, two specimens, and September, two specimens (N. T. Lawrence, Forest and Stream, X, 1878, p. 235), and Far Rockaway, L. I., August, one specimen (N. T. Lawrence, Auk, II, 1885, p. 273).

Least Sandpiper; Peep; Meadow Oxeye (*Actodromas minutilla*). This is one of our commonest Sandpipers, and shares the names "Peep" or "Oxeye" with the Semipalmated Sandpiper. It is seen in small flocks running along our shores and beaches. It passes northward during May and returns about July 10, the fall migration being concluded about September 1.

Red-backed Sandpiper; Lead-back (*Pelidna alpina sakhalina*). A very common migrant on our coasts, less common in the spring than in the fall. It migrates northward in early May and returns about September 1, remaining until November.

Curlew Sandpiper (*Erolia ferruginea*). "Old World in general, occasional in eastern North America." There are several records of its occurrence on Long Island.

Semipalmated Sandpiper; Peep; Sand Oxeye (*Ereunetes pusillus*). This is our most common Sandpiper, and during its fall migration it is abundant along our shores in small flocks. It migrates northward during May, returns about July 10, and the fall migration is not concluded until about October 1.

Western Sandpiper (*Ereunetes mauri*). This is the western representative of the preceding species. It is not infrequently found on our coast, generally associated with *E. pusillus*. Braislin (Auk, XVI, 1899, p. 191) records it as abundant on Long Island in the fall of 1897.

Sanderling; Surf Snipe (*Calidris alba*). An abundant migrant along our coasts, where, as a rule, it is found on the outer beaches. It passes northward during May and returns on its southward journey about July 10, from which date until October it is more or less numerous.

Marbled Godwit; Brown Marlin (*Limosa fedoa*). This is a rare bird on the Atlantic coast, where it occurs only as an irregular fall visitant.

Hudsonian Godwit; Ring-tailed Marlin (*Limosa hæmastica*). In this vicinity the Ring-tailed Marlin is an irregular fall migrant (Dutcher, Auk, III, 1889, p. 437). Kobbe (Auk, XXI, 1904, p. 79) records a flight of this species as occurring at Quogue, L. I., August 31, 1903.

***Greater Yellow-legs** (*Totanus melanoleucus*). A common migrant, arriving in the spring about the latter half of April and returning in the latter half of July, the migration not being concluded until November.

Yellow-legs; Summer Yellow-legs (*Totanus flavipes*). Very rare in the spring, but abundant during its southward migration, which begins about July 15 and ends in September.

***Solitary Sandpiper** (*Helodromas solitarius*). A not uncommon migrant passing northward in May and returning in July. It is not a true Shore-bird, but is more frequently found near fresh-water ponds and streams.

Willet (*Catoptrophorus semipalmatus*). In this vicinity it occurs only as a rare fall migrant. It is probable that the Western Willet (*C. s. inornata*) is also occasionally found on our coasts.

Ruff (*Pavoncella pugnax*). "Northern parts of the Old World, straying occasionally to eastern North America." There are three specimens of this bird in the American Museum from North America, two of which, in the Lawrence Collection, are labeled "Long Island," while the third is in the Elliot Collection and is labeled "Barnegat, N. J." (For record of the occurrence of this species in America, see Deane, Auk, XXII, 1905, p. 411; and Palmer, Auk, XXIII, 1906, p. 99.)

Bartramian Sandpiper; Upland Plover; Field Plover (*Bartramia longicauda*). A rather rare migrant and still rarer summer resident. It arrives about the middle of April and frequents fields and pastures.

Buff-breasted Sandpiper (*Tryngites subruficollis*). A bird of the interior, breeding in the far north and wintering in South America. It is very rare on the Atlantic coast. Giraud records "a party of five" as seen in August and September (N. T. Lawrence, Forest and Stream, X, 1879, p. 235); one was taken in August at Montauk Point (Berier, Bull, N. O. C., VI, 1880, p. 126); Dutcher mentions an August specimen from Suffolk County and a midsummer bird from Shinnecock Bay (Auk, VI, 1889, p. 136); and Braislin records a male taken August 30, 1903 at Rockaway Beach (Auk, XXII, 1905, p. 169).

***Spotted Sandpiper; Tip-up** (*Actitis macularia*). This is the common Sandpiper so frequently seen on our ponds, streams and beaches, and is one of the few members of this family which breeds here. It arrives about April 25 and remains until October.

Long-billed Curlew; Sickle-bill (*Numenius longirostris*). A rare and irregular fall visitant.

Hudsonian Curlew; Jack Curlew (*Numenius hudsonicus*). The Jack Curlew, as it is locally known, is a not uncommon migrant in this vicinity. It passes northward in May, and the southern migration occurs between the middle of July and the first of October.

Eskimo Curlew; Dough-bird; Fute (*Numenius borealis*). This species has decreased in numbers during recent years and is believed by some ornithologists to be on the verge of extinction. There is but one record of its recent occurrence, that of a male shot by R. L. Peavey at Rockaway Beach, L. I., September 14, 1902 (Braislin, Auk, XXI, 1904, p. 289).

FAMILY CHARADRIIDÆ. PLOVERS.

Lapwing (*Vanellus vanellus*). An Old World species, of accidental occurrence in America. The only record for eastern North America south of Greenland is that of a specimen shot at Merrick, L. I., December, 1883, (Dutcher, Auk, III, 1886, p. 438).

Black-bellied Plover; Beetle-head (*Squatarola squatarola*). A common migrant, more numerous in the fall. It passes northward from about April 15 to June 1, and the return migration occurs between August 1 and November 1.

Golden Plover; Green-back (*Charadrius dominicus*). A rare spring and common fall migrant, occurring chiefly in September.

Kildeer (*Oxyechus vociferus*). In the neighborhood of New York City the Kildeer is a rare summer resident and not uncommon migrant. It arrives in March and remains with us until November.

Semipalmated Plover; Ring-neck (*Ægialitis semipalmata*). The Ring-neck is one of our most common shore-birds. It passes northward in May and returns about July 15, the fall migration not being concluded until October 1.

Piping Plover (*Ægialitis meloda*). It is here a rare local summer resident and more common migrant, arriving in April and remaining until September.

Wilson's Plover (*Ochthodromus wilsonius*). Breeds as far north as Virginia, and strays casually to Nova Scotia. There are several records for Long Island (Dutcher, Bull. N. O. C., IV, 1879, p. 242; Auk, III, 1886, p. 438, Shinnecock Bay), and one for Bridgeport, Conn. (Averill, List of Birds found in the vicinity of Bridgeport, 1892, p. 9).

FAMILY APHRIZIDÆ. SURF BIRDS AND TURNSTONES.

Turnstone; Brant-bird; Calico-back (*Arenaria morinella*). With us it is a common migrant passing northward in May, returning about August 1 and remaining until September.

FAMILY HÆMATOPODIDÆ. OYSTER-CATCHERS.

Oyster-catcher (*Hæmatopus pallitus*). Breeds as far north as Virginia and occasionally strays to Nova Scotia. It is here of rare and irregular occurrence (Dutcher, Auk, X, 1893, p. 272).

ORDER GALLINÆ. GALLINACEOUS BIRDS.

FAMILY TETRAONIDÆ. GROUSE, PARTRIDGES, ETC.

***Bob-white; Quail** (*Colinus virginianus*). Quail are not uncommon in the vicinity of New York, but they are so eagerly hunted, that, as the country becomes more thickly settled, only the most rigid enforcement of the game-laws will preserve them from extermination. Recent severe winters have greatly decreased the numbers of this species, virtually exterminating it in some localities, and were it not for the liberation of southern birds by sportsmen, it is probable that the species would be exceedingly rare if not indeed extinct throughout most of the region surrounding New York City. (See group, second floor).

***Ruffed Grouse; Partridge** (*Bonasa umbellus*). Partridges are much less common with us than Quails. They are birds of the woods, and for this reason disappear with the forests, while Quails, on the contrary become more numerous as the country is cleared. (See group, second floor).

In the early part of the nineteenth century Pinnated Grouse or Heath Hens (*Tympanuchus cupido*) were abundant in some parts of Long Island, but they have been extinct for about sixty years (Giraud, Birds of Long Island, p. 195, and Dutcher, Auk, X, 1893, p. 272). As late as 1860 odd this species occurred in numbers on the Plains of the Jersey Pine Barrens west of Barnegat, where it was exterminated by indiscrimate shooting at all seasons (Chapman, Bird-Lore, V, 1903, p. 50).

The Wild Turkey (*Meleagris gallopavo silvestris*) is still found in small numbers in the wilder, more mountainous portions of Pennsylvania, but has

long been extinct in this vicinity. De Kay (Zoölogy of New York, II, Birds, 1844, p. 200) writes that he had not met with the species in New York State, but was informed at the time he wrote it was found in the counties of Sullivan, Rockland, Orange, Alleghany and Cattaraugus. This species is not mentioned by either Giraud or Lawrence.

Order COLUMBÆ. Pigeons.

Family COLUMBIDÆ. Doves and Pigeons.

Passenger Pigeon; Wild Pigeon (*Ectopistes migratorius*). Fifty years ago the Wild Pigeon was an abundant bird in the vicinity of New York, but here, as elsewhere throughout its range, it has become very rare. In place of the thousands that used to visit us it is now observed irregularly and rarely. (Lawrence, Auk, VI, 1889, p. 196, and Dutcher, Auk, X, 1893, p. 274). There appears to be but one definite record since 1894 of the occurrence of the Wild Pigeon near New York, that of an immature male shot at Englewood, N. J., June 23, 1896, by C. I. Wood (Chapman, Auk, XIII, 1896, p. 341).

***Mourning Dove** (*Zenaidura macroura*). A common summer resident, under favorable circumstances passing the winter.

Ground Dove (*Columbigallina passerina terrestris*). This is a species of the South Atlantic and Gulf States. It has been once taken in this vicinity (Grinnell, Bull. N. O. C., III, 1878, p. 147), but its occurrence is purely accidental, and it is possible that the specimen captured was an escaped cage-bird.

Order RAPTORES. Birds of Prey.

Family CATHARTIDÆ. American Vultures.

Turkey Vulture; Turkey Buzzard (*Cathartes aura septentrionalis*). Of more or less regular occurrence in New Jersey as far north as Plainfield in the interior and Sandy Hook on the coast. It is also occasionally seen on Long Island. One record notes the occurrence of a flock of eight birds of this species in Orange County, N. Y. (Reynolds, Forest and Stream, XVIII, 1894, p. 181).

Black Vulture (*Catharista urubu*). Breeds from North Carolina southward, and occasionally strays as far north as Maine. There are records for Sandy Hook, N. J. (Robt. B. Lawrence, Bull. N. O. C., V, 1880, p. 116), and Coney Island, L. I. (Berier, Bull. N. O. C., VI, 1881, p. 126).

Family FALCONIDÆ. Falcons, Hawks, Eagles, etc.

Swallow-tailed Kite (*Elanoides forficatus*). In this vicinity it has been recorded from Raynor South, L. I. (Giraud, Birds of Long Island, p. 13), "South shore of Long Island" (Berier, Bull. N. O. C., VI., 1881, p. 126), Chatham, N. J. (Herrick, Forest and Stream, XII, 1879, p. 165), and Piermont, N. Y. (Nicholas, Auk, XVII, 1900, p. 386).

***Marsh Hawk** (*Circus hudsonius*). A permanent resident, common except during the winter.

***Sharp-shinned Hawk** (*Accipiter velox*). It is here an uncommon summer and rare winter resident.

***Cooper's Hawk** (*Accipiter cooperi*). With us a not uncommon summer and rare winter resident. This bird, the Sharp-shinned Hawk and the rare Duck Hawk and Goshawk, are the only species of our Hawks which habitually live on birds. The others feed largely on insects and small field-mice, and being thus actually beneficial, should be protected by law.

Goshawk (*Astur atricapillus*). A rare winter visitant.

***Red-tailed Hawk** (*Buteo borealis*). The Red-tail is one of our commonest Hawks and is resident throughout the year.

***Red-shouldered Hawk** (*Buteo lineatus*). A permanent resident. It is probably our most common Hawk and with the Red-tail is the one to which the name "Chicken," or "Hen Hawk," is generally, but incorrectly, applied.

Swaison's Hawk (*Buteo swainsoni*). A western species of rare occurrence on the Atlantic coast. There is apparently but one record of its capture near New York City, that of a specimen shot near Cornwall, N. Y., October 14, 1892 (Dutcher, Auk, X, p. 83).

***Broad-winged Hawk** (*Buteo platypterus*). A rather uncommon summer resident.

Rough-legged Hawk (*Archibuteo lagopus sancti-johannis*). A rare winter resident.

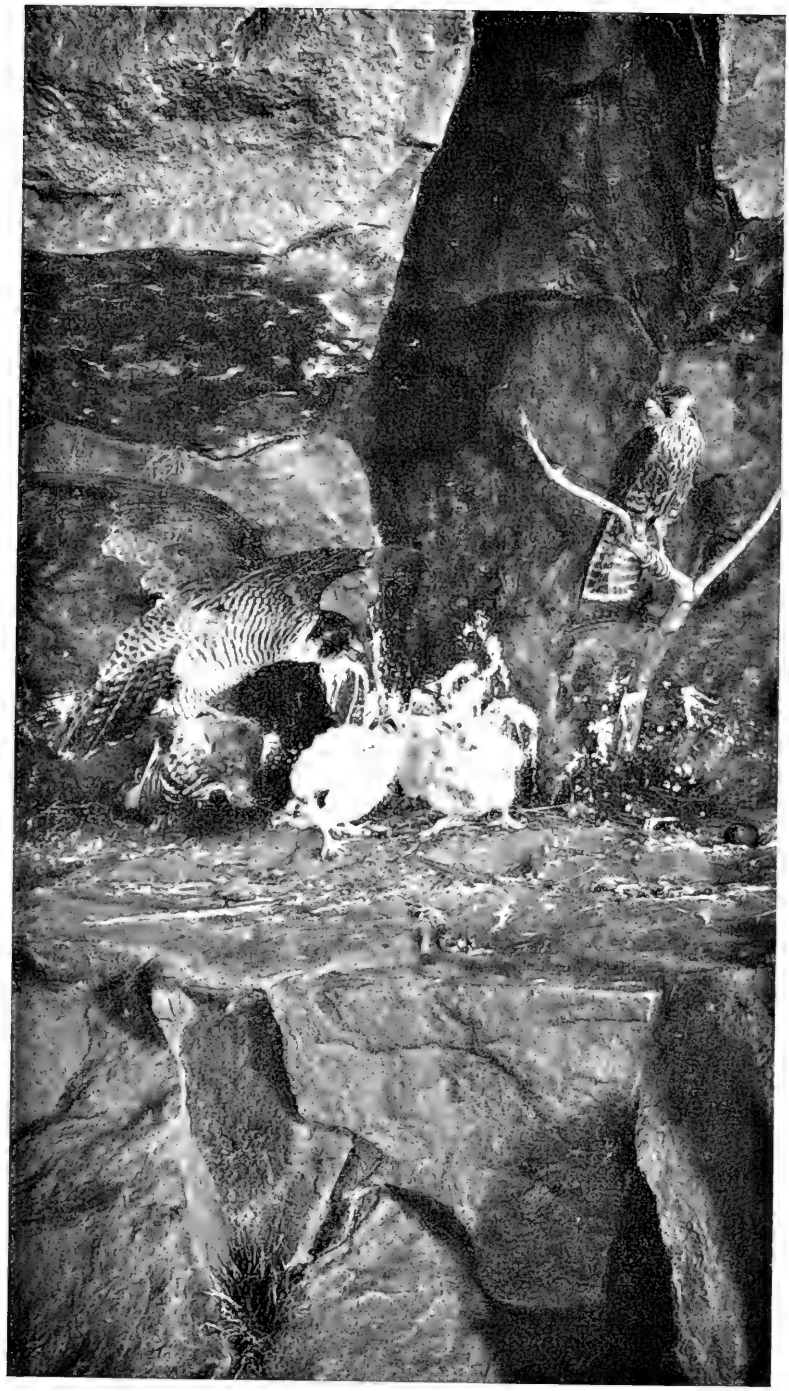
Golden Eagle (*Aquila chrysaetos*). North America, of rare occurrence east of the Mississippi. It has been recorded from Islip, L. I. (Giraud), Canarsie, L. I. (Dutcher), Gravesend, L. I. (Johnson), Long Branch, N. J. (Chapman, Auk, XV, 1898, p. 54), and Highland Falls, N. Y. where Mearns states, it is occasionally observed and was formerly known to nest.

***Bald Eagle** (*Haliætus leucocephalus*). This Eagle is here a rather rare bird; it is said by Mearns to nest in the Highlands of the Hudson. On Long Island it is a not uncommon resident and breeds in several localities (Dutcher MS).

Gyrfalcon (*Falco rusticolus gyrfalco*). An arctic species, rarely visiting the United States. The only record for this vicinity is that of a specimen killed on Long Island in the winter of 1856 (Lawrence, Ann. Lyc. Nat. Hist., New York, VIII, 1866, p. 280; see also Brewster, Auk, XII, 1895, p. 180).

Black Gyrfalcon (*Falco rusticolus obsoletus*). "Labrador, south in the winter to Maine and New York." There is but one record of its occurrence in this vicinity, viz., a specimen shot in the fall of 1875, near Flushing, L. I. (Berier, Bull. N. O. C., VI, 1881, pp. 126, 247).

Duck Hawk (*Falco peregrinus anatum*). This Falcon, the "noble Peregrine" of Falconry, is a not uncommon migrant, especially along our coast, and is a rare summer resident along the Palisades and Highlands of the Hudson, where it is known to breed. (See group, second floor).



DUCK HAWK
Group, Hall No. 204

Pigeon Hawk (*Falco columbarius*). A common migrant, occurring chiefly on our coasts.

American Sparrow Hawk (*Falco sparverius*). With us it is a not common resident but abundant migrant along the coasts.

American Osprey; Fish Hawk (*Pandion haliætus carolinensis*). A locally abundant summer resident arriving early in April and remaining until October. At certain localities along our coasts, the Fish Hawk is found nesting in colonies.

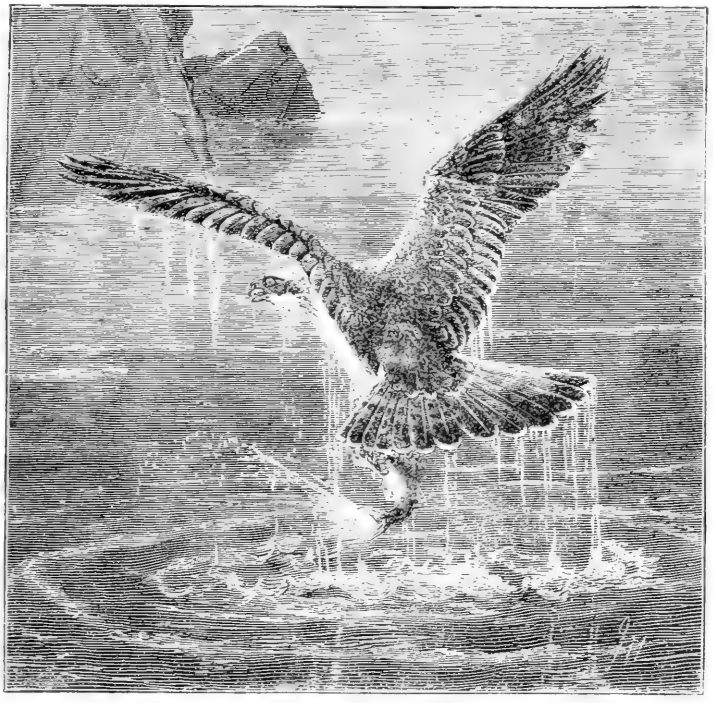


FIG. 9. AMERICAN OSPREY.

FAMILY STRIGIDÆ. BARN OWLS.

American Barn Owl (*Strix pratincola*). Occasionally found as far north as Massachusetts, and breeds from Long Island southward through Mexico. The Barn Owl is here a rare permanent resident. There are numerous records of its nesting, and it appears to have increased in numbers during recent years.

FAMILY BUBONIDÆ. HORNED OWLS, ETC.

***American Long-eared Owl** (*Asio wilsonianus*). A rather uncommon resident.

Short-eared Owl (*Asio accipitrinus*). Common during the migrations, and while a few probably breed, their is no definite record of their doing so.

***Barred Owl** (*Syrnium varium*). Next to the Screech Owl this is our commonest Owl. Its loud, sonorous hooting, *whoo, whoo, whoo, too-whoo, too whoo-ah,* is heard in the spring and again in late summer and is familiar to many who are not acquainted with its author.

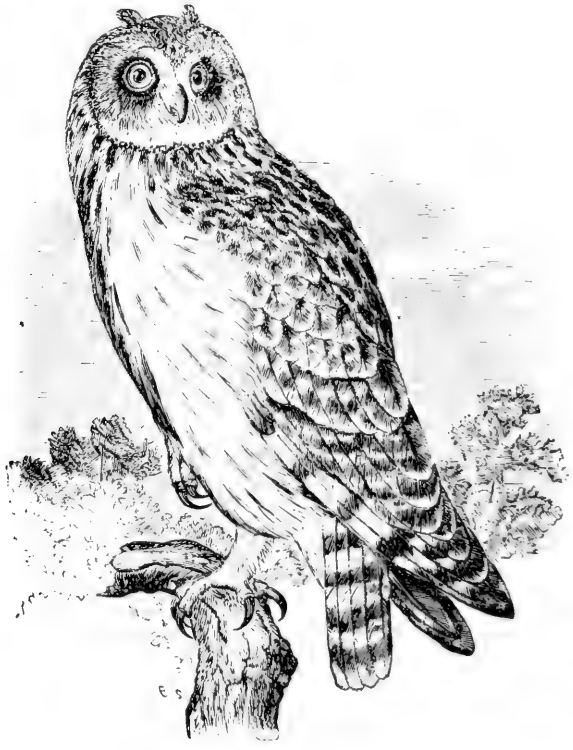


FIG. 10. SHORT-EARED OWL.

Great Gray Owl (*Scotiaptex nebulosa*). In winter to the northern border of the United States. An individual shot near Mendham, N. J., is the only one which has been recorded from near New York City (Thurber, True Democratic Banner, newspaper, Morristown, N. J., Nov. 10, 1887).

***Saw-whet Owl** (*Crytoglaux acadica*). A regular and, in some localities, a not uncommon winter resident.

Screech Owl (*Megascops asio*). The Screech Owl is the commonest and best known of our Owls. It is present throughout the year. (See group, second floor).

SCREECH OWL
Group, Hall No. 208

Great Horned Owl (*Bubo virginianus*). A rather rare resident. This is the only one of our Owls which habitually preys upon poultry, the others feed largely on field-mice and shrews.

***Snowy Owl** (*Nyctea nyctea*). An irregular winter visitant, sometimes occurring in considerable numbers.

Hawk Owl (*Surnia ulula caparoch*). There is apparently but one record of its capture in this vicinity, that of a specimen shot near Bay Ridge, L. I. (Dutcher Auk, X, 1893, p. 275).

Order COCCYGES. Cuckoos, etc.

Family CUCULIDÆ. Cuckoos, Anis, etc.

***Yellow-billed Cuckoo** (*Coccyzus americanus*). A common summer resident, arriving about May 10 and departing the last of September. (See group, third floor).

***Black-billed Cuckoo** (*Coccyzus erythrophthalmus*). A common summer resident arriving and departing at about the same time as the preceding species.

Family ALCEDINIDÆ. Kingfishers

***Belted Kingfisher** (*Ceryle alcyon*). A common summer resident, arriving the latter part of March and remaining until the streams and ponds, from which it obtains its food, are frozen.

Order PICI. Woodpeckers.

Family ALCEDINIDÆ. Kingfishers.

***Hairy Woodpecker** (*Dryobates villosus*). A rather uncommon resident.

***Downy Woodpecker** (*Dryobates pubescens medianus*) next to the Flicker, the Downy is our commonest Woodpecker.

Red-cockaded Woodpecker (*Dryobates borealis*). Southern United States, westward to Indian Territory, and northward to Tennessee and Virginia. This bird is accidental near New York, the only record of its occurrence being based on a specimen taken at Hoboken, N. J. (Lawrence, Ann. Lyc. Nat. Hist., VIII, 1866, p. 291).

***Yellow-bellied Woodpecker** (*Sphyrapicus varius*). A common spring and fall migrant.

Pileated Woodpecker (*Ceophlœus pileatus abieticola*). "Formerly whole wooded region of North America; now rare or extirpated in the more thickly settled parts of the Eastern States." This large Woodpecker occurs near New York only as a very rare straggler; there are no recent records.

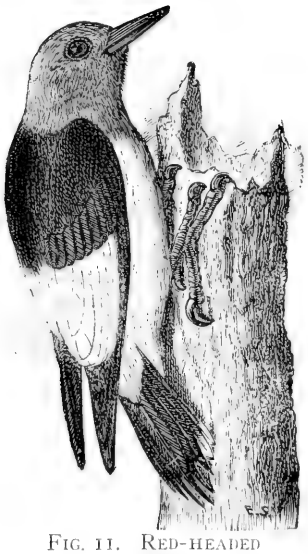


FIG. 11. RED-HEADED WOODPECKER.

*Red-headed Woodpecker (*Melanerpes erythrocephalus*). A summer resident of local distribution and a not uncommon and sometimes abundant migrant. Occasionally it is found in winter.

Red-bellied Woodpecker (*Centurus carolinus*). Eastern United States breeding from Florida to Virginia, and in the interior, to Ontario and Southern Dakota; occasionally strays to Massachusetts; winters from southern Ohio southward. Giraud speaks of this bird as breeding on Long Island, but it now occurs here only rarely and irregularly.

*Flicker: High-hole; Clape (*Colaptes auratus luteus*). Our commonest Woodpecker. It is resident, but is much more common in the summer than in the winter, and is particularly numerous during its migrations in September and October.

ORDER MACROCHRIES. GOATSUCKERS, SWIFTS, ETC.

FAMILY CAPRIMULGIDÆ. GOATSUCKERS.

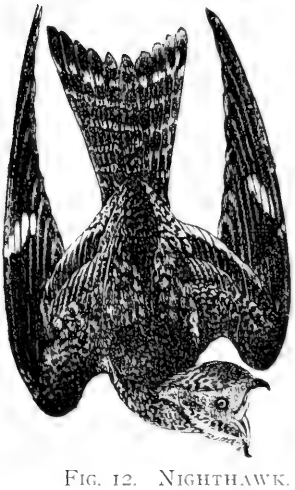


FIG. 12. NIGHTHAWK.

*Whip-poor-will (*Antrostomus vociferus*). In some localities near New York City the Whip-poor-will is a common summer resident. It arrives about May 1 and leaves about October 1.

*Nighthawk (*Chordeiles virginianus*). The Nighthawk is here a more or less common local summer resident. Even in New York City, where it has been known to lay eggs on the house-top, its characteristic note, *peent, peent,* uttered while it is coursing for food, is not infrequently heard. It arrives early in May and migrates southward in September and October, sometimes occurring at this season in large flocks.

FAMILY MICROPODIDÆ. SWIFTS.

*Chimney Swift (*Chætura pelagica*). An abundant summer resident, arriving the latter part of April and remaining until October. (See group, second floor).

FAMILY TROCHILIDÆ. HUMMINGBIRDS.

***Ruby-throated Hummingbird** (*Trochilus colubris*). This, the only species of Hummingbird found in eastern North America, is here a common summer resident, arriving early in May and remaining until October.

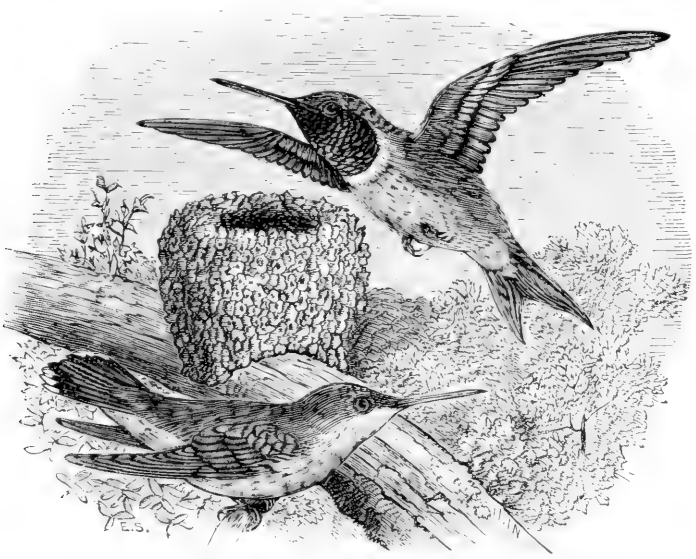


FIG. 13. RUBY-THROATED HUMMINGBIRDS AND NEST.

ORDER PASSERES. PERCHING BIRDS.

FAMILY TYRANNIDÆ. TYRANT FLYCATCHERS.

***Kingbird** (*Tyrannus tyrannus*). A common summer resident, arriving early in May and remaining until October. (See group, third floor).

Arkansas Kingbird (*Tyrannus verticalis*). A western species; the only records for this vicinity are those of a young male taken at Riverdale, N. Y., October 19, 1875, (Bicknell, Bull, N. O. C., IV, 1879, p. 60), and a specimen taken at Princeton, N. J., Sept. 29, 1894 (Phillips, Proc. D. V. O. C., II, p. 14).

***Great-crested Flycatcher** (*Myiarchus crinitus*). A common summer resident, arriving early in May and remaining until September.

***Phœbe** (*Sayornis phœbe*). A common summer resident arriving about March 20 and leaving early in November.

***Olive-sided Flycatcher** (*Nuttalornis borealis*). A migrant passing north in May, when it is apparently rare, and returning between the latter part of August and late September, when it is not uncommon.

*Wood Pewee (*Horizopus virens*). A common summer resident of our woods, arriving about May 15 and remaining until the latter part of September.

*Yellow-bellied Flycatcher (*Empidonax flaviventris*). A rather rare spring and not uncommon fall migrant, arriving in May and returning from its northern home early in August.

*Green-crested Flycatcher (*Empidonax virescens*). A common summer resident of the Lower Hudson River Valley as far north as Sing Sing. On Long Island it apparently breeds on the north shore, while there are but two records for Connecticut, an adult taken at Suffield, June 24, 1874 (Merriam, Birds, Conn., p. 58) and a nest with young at Greenwich, June 25, 1893 (Voorhees, Auk, XI, 1894, p. 259). A rare summer resident in the vicinity of Plainfield, N. J. (Miller, MS). (See group, third floor).

Alder Flycatcher (*Empidonax trailli alnorum*). A rather rare migrant and a local summer resident. A nest and eggs, not fully identified, but with little doubt that of this species, was found by C. L. Brownell at Nyack, N. Y. At Plainfield, N. J., W. DeWitt Miller has found this species a locally common breeding bird (Auk, XVIII, 1901, p. 108; XX, 1903, p. 68).

*Least Flycatcher (*Empidonax minimus*). A common summer resident; it arrives about May 1 and remains until late in September.

FAMILY ALAUDIDÆ. LARKS.

Skylark (*Alauda arvensis*). Individuals of this species have from time to time been liberated near New York City. In 1887 a small colony became established near Flatbush, L. I., where a nest containing young was found (Dutcher, Auk, V, 1888, p. 180). Without apparent increase these birds evidently manage to hold their own (Braislin, Auk, XVI, 1899, p. 191; Bildersee, Bird-Lore, VI, 1904, p. 204).

FIG. 14. HORNED LARK.

Horned Lark; Shore Lark (*Otocoris alpestris*). A common winter resident along the coasts; less common or very rare in the Hudson Valley.

Prairie Horned Lark (*Otocoris alpestris praticola*). This small race of the Horned Lark is of rather rare occurrence in this vicinity. It is apparently extending its range eastward and there is one record of its having probably bred on Long Island (Dutcher, Auk, V, 1888, p. 180), where it also occurs during the winter.

FAMILY CORVIDÆ. CROWS, JAYS, MAGPIES, ETC.

***Blue Jay** (*Cyanocitta cristata*). A common resident, more numerous during the fall migration than at other times of the year.

The Canada Jay (*Perisoreus canadensis*), a northern species, is included by Lawrence in his "Catalogue of Birds" on the basis of an individual killed in July near Manhattanville, New York City. This specimen is now in the American Museum (No. 42,253). Its plumage is much worn and its toe-nails are abnormally long, facts which, taken in connection with the place and date of the bird's capture, induce me to believe that it had escaped from confinement.

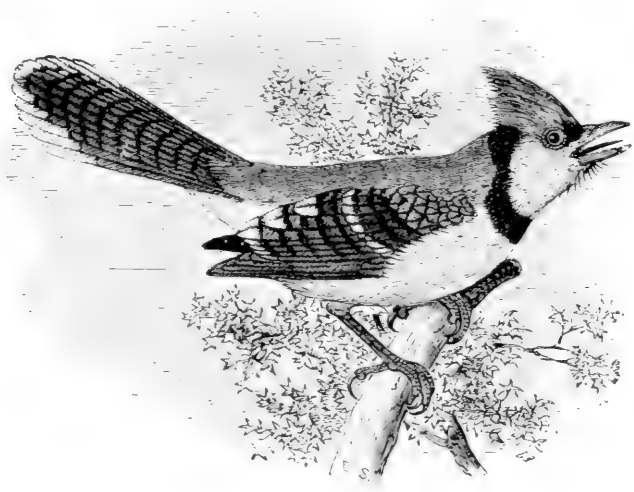


FIG. 15. BLUE JAY.

American Raven (*Corvus corax principalis*). Now of very rare occurrence in this vicinity. It is said to have been formerly common on the northern New Jersey coast (Lawrence), and is still uncommon along the southern coast of the State (Stone, Auk, XI, 1894, p. 137).

***American Crow** (*Corvus brachyrhynchos*). The Crow is here an abundant resident, but, as in the case of other species which are present the year round, it is probable that the individuals which summer with us pass the winter farther south, while our winter birds come to us from the north.

***Fish Crow** (*Corvus ossifragus*)). A common inhabitant of the Lower Hudson River Valley as far north as Sing Sing and occasionally reaches Highland Falls. In Connecticut it is of regular occurrence as far east as Stratford (Eames, Auk, VI, 1889, p. 338), while on Long Island its exact status appears to be unknown, though it is probably not uncommon. A few remain on the coast during the winter.

FAMILY STURNIDÆ. STARLINGS.

FIG. 16. STARLING, (SUMMER PLUMAGE).

*Starling (*Sturnus vulgaris*). This Old World species has been introduced into this country on several occasions, but only the last importation appears to have been successful. The birds included in this lot were imported and released in Central Park, under the direction of Eugene Schieffelin of this city. They seem to have left the Park and to have established themselves in various places in the upper part of the city. A pair have bred for three successive seasons in the roof of this Museum. S. H. Chubb reports a pair nesting in a church at 122nd st. and Lenox avenue, and they also have nested at 100th st. and Riverside Drive. C. B. Isham tells me he has found their nest at Kingsbridge, New York City, and that he repeatedly observed a flock of fifty birds in the same locality during the late summer and fall of 1893 and 1894.

To the above statement, which stands as it appeared in the first (1894) edition of this List, may be added the further information, obtained from Mr. Schieffelin, that 80 Starlings were released on March 6, 1890, and 40 more on April 25, 1891. So far as I am aware the present (1906) boundary of the range of this species in America is marked by New Haven, Conn., on the east, Ossining, N. Y., on the north and Red Bank and Princeton, on the south. It is resident throughout the year, but gathers in flocks, sometimes containing several hundred birds, in the fall, when it wanders about the country. Its economic status remains to be determined, but from the bird-

FIG. 17. STARLING, (WINTER PLUMAGE).

lover's point of view the Starling is a decided acquisition to the bird-life of our cities where its long-drawn, cheery whistle is in welcome contrast to the noisy chatter of House Sparrows.

FAMILY ICTERIDÆ. BLACKBIRDS, ORIOLES, ETC.

***Bobolink; Reedbird** (*Dolichonyx oryzivorus*). A locally distributed summer resident, arriving in early May and remaining until October. In August the males assume the Reedbird plumage and resort to our wild-rice marshes, where they are joined by large numbers from the north, which pause to feed on the wild-rice.

Twenty-five years ago the Bobolink was an abundant and generally distributed summer resident in this vicinity. Since that date it has rapidly decreased in numbers and is now entirely wanting in localities where it was formerly of regular occurrence.

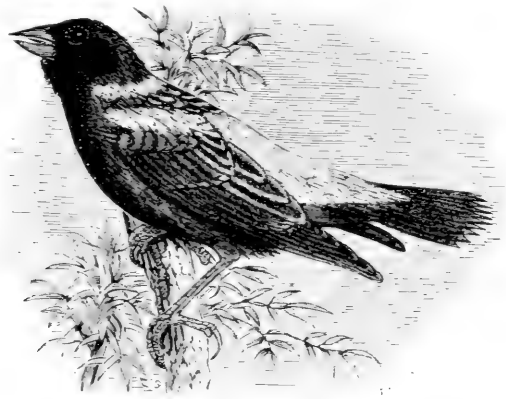


FIG. 18. BOBOLINK.

***Cowbird** (*Molothrus ater*). A common summer resident arriving late in March and remaining until November. It has been recorded as occurring in winter (Foster, Abst. Proc. Linn. Soc., No. 5, 1893, p. 2).

***Red-winged Blackbird** (*Agelaius phœniceus*). A common summer resident, abundant during the migrations when it occurs in large flocks. It is one of the first birds to reach us in the spring, frequently arriving before March 1, and it remains until December.

***Meadowlark** (*Sturnella magna*). A common summer resident, occuring in reduced numbers during the winter, when it is largely confined to the extensive marshes near the coast.

***Orchard Oriole** (*Icterus spurius*). A common summer resident, arriving early in May and remaining until September. (See group, third floor).

*Baltimore Oriole (*Icterus galbula*). A somewhat more common summer resident than the preceding species. It arrives early in May and remains until September. (See group, third floor).

*Rusty Blackbird (*Euphagus carolinus*). A common migrant, passing northward in March, returning in September and sometimes remaining during the winter.

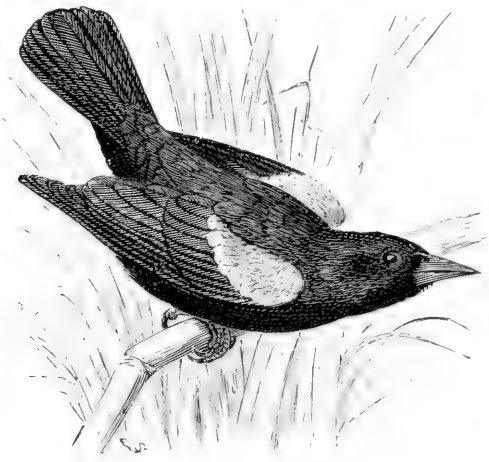


FIG. 19. RED-WINGED BLACKBIRD.

*Purple Grackle: Crow Blackbird (*Quiscalus quiscula*). A common summer resident of local distribution, nesting in colonies. It is one of our earliest migrants, arriving from the south with the Red-winged Blackbird about March 1. During the breeding season it is not seen far from the vicinity of its nest, but about July 1, when the young are on the wing, the birds gather in small flocks and wander over the country, pausing wherever they find an abundance of food. These flocks gradually coalesce and, in October and November, form enormous gatherings numbering thousands of birds.

*Bronzed Grackle (*Quiscalus quiscula æneus*). A spring and fall migrant, sometimes not uncommon.

FAMILY FRINGILLIDÆ. FINCHES, SPARROWS, ETC.

Evening Grosbeak (*Hesperiphona vespertina*). During the winter and early spring of 1890 there was a phenomenal incursion of Evening Grosbeaks into the northern United States. The most southern record of their occurrence in the Atlantic States was at Summit, N. J., where, on March 6, Mr. W. O. Raymond observed a flock of eight birds (Orn. and Oöl., XV, 1890, p. 46). No specimens were collected, but Mr. Raymond watched the birds for some time at a distance of about eight feet, and he has since examined skins of the species in this Museum, thus confirming his identification.

***Pine Grosbeak** (*Pinicola enucleator leucura*). This species occurs here in the winter and then only at irregular intervals. It last appeared in numbers during the winter of 1903-4 when it was first observed at Englewood, N. J., Oct. 25 (Chapman, Bird-Lore, V, 1903, p. 199).

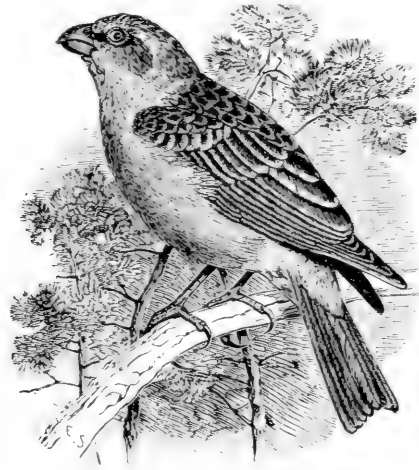


FIG. 20. PINE GROSBEAK.

***House Sparrow; English Sparrow** (*Passer domesticus*). From the report of the Division of Economic Ornithology of the Department of Agriculture (Washington, 1889), we learn that English Sparrows were first introduced into New York City in 1860, when twelve birds were released in Madison Square. In 1864 they were introduced in Central Park, and in 1866 two hundred were set free in Union Park. From these, and one or two other small additional importations of a few pairs each, have descended the countless numbers of Sparrows which to-day inhabit our streets and parks. In this latitude the English Sparrow has been known to rear six broods in a season, and their marvelous rate of increase is graphically given in a table in the report already mentioned, which shows that in ten years the progeny of a single pair might amount to 275,716,983,698.

With the discordant notes of these ubiquitous little pests constantly in our ears we may read with mixed humor and regret the following quotation from Lawrence's Catalogue of New York Birds (Ann. Lyc. Nat. Hist., VIII, 1866, p. 287): "I first observed them in the spring of 1865. A friend, conversant with our local native birds, informed me that he had seen a species in the shrubbery around the church on the corner of 5th avenue and 29th street, with which he was not familiar; on going to ascertain what they were, to my surprise I found them to be House Sparrows; they were domiciled in the ivy which grew on the walls of the church, and were quite gentle and fearless, some alighting in the street and dusting themselves quite near to where I stood."

*The European Chaffinch (*Fringilla cælebs*), several pairs of which were released in Central Park under the direction of Eugene Schieffelin in 1890, is occasionally observed in Central Park where three individuals appear to exist at present. Whether, however, they are the descendants of the introduced birds or escaped cage-birds is unknown.

*The Greenfinch (*Chloris chloris*) a European species was observed in Central Park, May 17, 1903, by C. G. Abbott.

*Purple Finch (*Carpodacus purpureus*). In the vicinity of New York City the Purple Finch is a rather rare summer resident, a very common migrant and irregular winter resident. It is apparently increasing in numbers during the summer on Long Island (Dutcher, MS).

*American Crossbill (*Loxia curvirostra minor*). A regular winter visitant. This erratic species has on several occasions been found breeding south of its regular breeding range. Such an instance occurred at Riverdale, N. Y., where it was found nesting on April 22, 1874 (Bicknell, Bull. N. O. C., IV, 1880, p. 7).

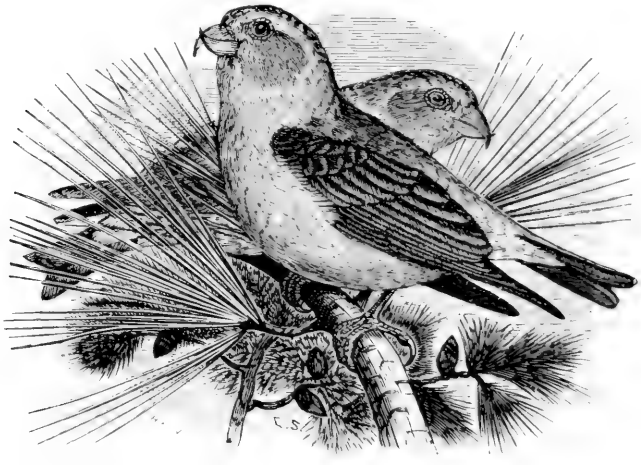


Fig. 21. American Crossbill.

*White-winged Crossbill (*Loxia leucoptera*). Of more rare and irregular occurrence in winter than the preceding species. This and the preceding species last occurred in numbers during the winter of 1899-1900 (Chapman Bird-Lore, II, 1900, pp. 25, 59).

Redpoll (*Acanthis linaria*). This species is here an irregular winter visitant, sometimes occurring in considerable numbers.

Greater Redpoll (*Acanthis linaria rostrata*). Two specimens taken at Sing Sing, N. Y., are the only individuals of this species which have been recorded from this vicinity (Fisher, Bull. N. O. C., VIII, 1883, p. 121).

The European Linnet (*Acanthis cannabina*) is recorded from Scarboro, N. Y. (G. H. Thayer, Auk, XVII, 1900, p. 389); but the large number of cage-birds of this species annually imported into this country makes it probable that the bird secured was an assisted immigrant.

FIG. 22. REDPOLL.

***American Goldfinch** (*Astragalinus tristis*). The Goldfinch, Yellowbird, or Thistlebird, is a common resident here.

FIG. 23. AMERICAN GOLDFINCH.

***European Goldfinch** (*Carduelis carduelis*). A European species which was introduced into this country at Hoboken, N. J., in 1878. The following year it appeared in Central Park and has since spread over the upper parts of the city where in favorable localities it is not uncommon. It is with us throughout the year. (Adney, Auk, III, 1886, p. 409).

*Pine Siskin; Pine Finch (*Spinus pinus*). A more or less common fall and winter visitant. On two occasions it has been found nesting in the Lower Hudson Valley, at Sing Sing, May 25, 1883 (Fisher, Bull. N. O. C., VIII, 1883), and at Cornwall-on-Hudson, May 12, 1887 (Allen, Auk, IV, 1887, p. 284). (See group, third floor).

*Snowflake; Snow Bunting (*Passerina nivalis*). On Long Island this bird is an abundant winter resident on the sand-flats near the ocean (Dutcher, MS). In the Lower Hudson Valley it is much less common.

Lapland Longspur (*Calcarius lapponicus*). A rare winter resident; sometimes found with flocks of the preceding, but more frequently associated with Horned Larks.

Chestnut-collared Longspur (*Calcarius ornatus*). "Interior of North America, from the Saskatchewan Plains south to Texas." A specimen of this western species was taken at Long Island City, February 16, 1889 (Hendrickson, Auk, VI, 1889, p. 190).

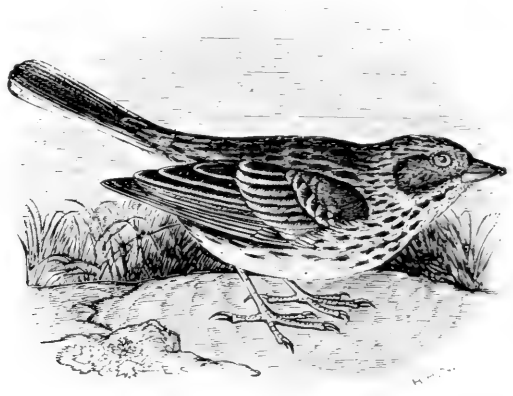


FIG. 24. VESPER SPARROW.

*Vesper Sparrow; Grass Finch: Bay-winged Bunting (*Poœcetes gramineus*). A common summer resident, arriving about April 1, and remaining until the latter part of November.

Ipswich Sparrow (*Passerculus princeps*). A common winter resident, confined strictly to the immediate vicinity of the coasts, where it is found from the middle of October to the first of April (Dutcher, Auk, III, 1886, p. 441).

*Savanna Sparrow (*Passerculus sandwichensis savanna*). This species is here a rare summer resident and abundant migrant, arriving about April 1 and departing in November and December. It breeds at Morristown, N. J. (Thurber) and is said to remain throughout the winter in the salt-marshes at Bridgeport, Conn. (Averill) Braislin, (Auk, XVI, 1899, p. 192) records it from Garden City, L. I., July 17, 1897, and Flatbush, L. I., Jan. 30, 1895.

Grasshopper Sparrow; **Yellow-winged Sparrow** (*Coturniculus savannarum passerinus*). Locally a common summer resident, arriving about May 1 and remaining until October.

Henslow Sparrow (*Ammodramus henslowi*). In this vicinity the Henslow sparrow has been found in but few localities where, however, it is apparently not uncommon. It is recorded as breeding at Morristown, N. J. (Thurber), and Boonton, Morris County, N. J. (Judd, Auk, XIV, 1897, p. 326). Summer resident in small numbers near Plainfield, N. J. (Miller, MS).

Sharp-tailed Sparrow (*Ammodramus caudacutus*). An abundant summer resident; with the exception of a colony on the Hudson at Piermont, confined entirely to the salt marshes of our coasts. (See group, third floor).

Nelson Sharp-tailed Sparrow (*Ammodramus nelsoni*). This species is known here only as a rather rare fall migrant in the Hudson River Valley, occurring from the latter part of September to the latter part of October.

Acadian Sharp-tailed Sparrow (*Ammodramus nelsoni subvirgatus*). Occurs with the preceding. (On the distribution of the Sharp-tailed Sparrows see Dwight, Auk, XIII, 1896, p. 275).

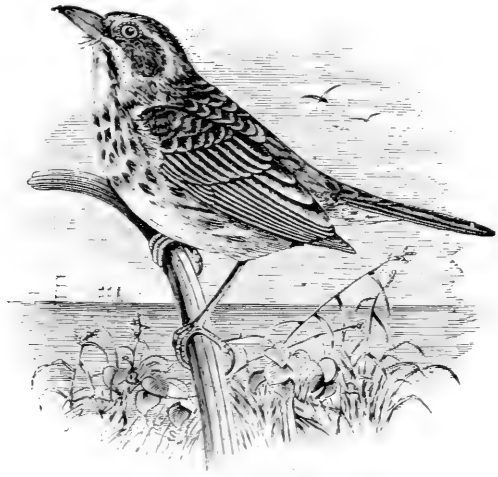


FIG. 25. SEASIDE SPARROW.

Seaside Sparrow (*Ammodramus maritimus*). This is an even more abundant summer resident than the Sharp-tailed Sparrow and, like it, is confined exclusively to our coasts, with the exception of a colony in the Piermont marshes. (See group, third floor).

Lark Sparrow (*Chondestes grammacus*). Interior of North America, eastward to Illinois, breeding from Texas to Manitoba; accidental on the Atlantic coast. There are two records for this vicinity, Sayville, L. I., August 20, 1879 (Earle, Bull. N. O. C., VI, 1881, p. 58) and Schraalenburg, N. J., November 26, 1885 (Chapman, Auk, III, 1886, p. 136).

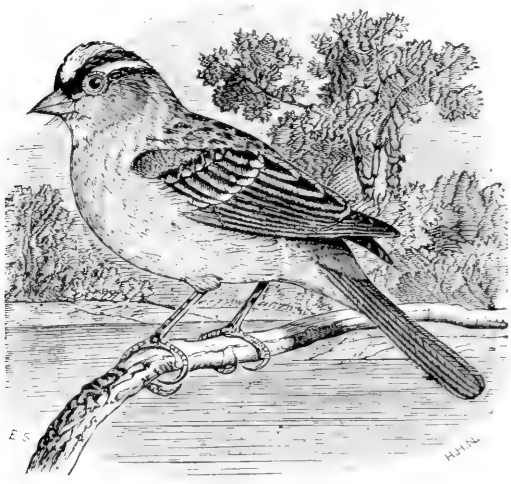


FIG. 26. WHITE-CROWNED SPARROW.

*White-crowned Sparrow (*Zonotrichia leucophrys*). A rather rare migrant passing northward in May and returning in October. Braislin (Auk, XV, 1898, p. 59) records a specimen taken at Parkville, L. I., April 10, 1897.

*White-throated Sparrow (*Zonotrichia albicollis*). An abundant migrant and locally common winter resident. It arrives from the north the latter part of September and remains with us until the middle of May.

*Tree Sparrow (*Spizella monticola*). An abundant winter resident, arriving from the north about November 1 and remaining until April.

FIG. 27. WHITE-THROATED SPARROW.

***Chipping Sparrow; Chippy** (*Spizella socialis*). An abundant summer resident, arriving from the south about April 1 and remaining until November.

***Field Sparrow** (*Spizella pusilla*). An abundant summer resident, appearing in the spring about April 1 and not departing southward until November or even December. Of rare but regular occurrence in winter at Plainfield, N. J. (Miller, MS). (See group, third floor).

***Junco; Snowbird** (*Junco hyemalis*). The Junco is one of our most abundant winter birds. It comes to us from the north late in September and remains until May.

FIG. 28. JUNCO.

***Song Sparrow** (*Melospiza cinerea melodia*). An abundant summer and common winter resident. (See group, third floor).

Lincoln Sparrow (*Melospiza lincolni*). In this vicinity the Lincoln Sparrow is a rare but regular migrant, passing northward in May and southward in September and October.

***Swamp Sparrow** (*Melospiza georgiana*). An abundant summer resident, especially in the great marshes of the Hackensack, and a rare winter resident. (See group, third floor).

***Fox Sparrow** (*Passerella iliaca*). A common spring and fall migrant, passing northward in March and April and southward in October and November. There are several winter records for Princeton, N. J. (Scott, Bull. N. O. C., IV, 1879, p. 82).

*Towhee; Chewink (*Pipilo erythrophthalmus*). An abundant summer resident, arriving about April 20, remaining until late October, and rarely into the winter. (See group, second floor).

*Cardinal (*Cardinalis cardinalis*). The vicinity of New York City is about the northern limit of the Cardinal's range on the Atlantic coast. It is here a not uncommon resident of local distribution. In the Hudson Valley it is rarely found north of Hastings and Nyack; it is very rare eastward along the sound, and also on Long Island, but is common in Central Park, New York City, where I have seen nine individuals at one time. (See group, second floor).

*Rose-breasted Grosbeak (*Zamelodia ludoviciana*). A common summer resident in the Hudson River Valley, arriving about May 1 and remaining until October. On Long Island it is a rare summer resident (Dutcher, MS). (See group, second floor).

*Blue Grosbeak (*Guiraca cærulea*). There are several records of this southern bird's occurrence in this vicinity. It has been taken at Canarsie, L. I., May, 1843 (Dutcher, Auk, V, 1893, p. 276); Morristown, N. J. (Thurber, True Democratic Banner, newspaper, Nov. 17, 1889); Snake Hill, N. J. (Bicknell, Bull. N. O. C., III, 1878, p. 132), and Manhattan Island (DeKay, Birds, N. Y., p. 146).

*Indigo Bunting (*Cyanospiza cyanea*). A common summer resident in this vicinity, arriving about May 1 and remaining until October 1.

Painted Bunting (*Cyanospiza ciris*). Breeds from the Gulf States northward to Kansas, southern Illinois and North Carolina. The capture of several specimens of this bird in this vicinity has been recorded (Bicknell, Bull. N. O. C., III, 1878, p. 132). It is possible that they were escaped cage-birds.

Dickcissel; Black-throated Bunting (*Spiza americana*). Eastern United States, mostly in the Mississippi Valley, breeding from Texas to Minnesota, and wintering in Central and South America. Breeds east of the Alleghanies now only rarely and locally. About forty years ago this bird was evidently a regular and not uncommon summer resident in this vicinity. (See Giraud, Chapman *apud* Galbraith, Auk, VIII, 1891, p. 395), but it occurs now only rarely and irregularly. Recent records are: Miller's Place, L. I., September 29 and October 10 (Dutcher, Auk, VI, 1889, p. 13) and Blithewood, L. I., August 25 (Johnson, Auk, VIII, 1891, p. 116). In July, 1904, W. De Witt Miller found a pair of this species breeding at Plainfield, N. J. (Auk, XXI, 1904, p. 487). J. Dwight, Jr., records the occurrence of a male Dickcissel at Kingston, N. Y., June 5, 1897 (Auk, XIV, 1897, p. 95).

Family TANAGRIDÆ. Tanagers.

Western Tanager (*Piranga ludoviciana*). Western North American north to British Columbia. The only record of the occurrence of this western species in this vicinity is that of a young male taken at Fort Montgomery, N. Y., December 21, 1881 (Mearns, Auk, VII, 1890, p. 55).

***Scarlet Tanager** (*Piranga erythromelas*). A common summer resident, arriving early in May and remaining until about October 1. (See group, third floor).

Summer Tanager (*Piranga rubra*). Eastern United States, breeding from Florida to southern New Jersey, wandering casually to Nova Scotia, and wintering in Central and South America. This species is of rare and irregular occurrence in this vicinity. (Hendrickson, Auk, I, 1885, p. 290; Dutcher, Auk, III, 1886, p. 412; XIX, 1902, p. 291; V, 1888, p. 181; Mearns, Auk, VII, 1890, p. 55; Braislin, Auk, XIX, 1902, p. 147).

FAMILY HIRUNDINIDÆ. SWALLOWS.

***Purple Martin** (*Progne subis*). This bird breeds in colonies and is of local distribution during the breeding season. It was formerly not uncommon in the vicinity of New York City, but the English Sparrows have taken possession of its nesting-houses, and at present it is found in but few places.

***Cliff Swallow; Eave Swallow** (*Petrochelidon lunifrons*). Like most of the Swallows it nests in colonies, and in this region generally places its mud nests beneath the projecting eaves of a barn. It appears to be less common during the summer than it was twenty or more years ago, but is a common migrant particularly in the fall. According to Mearns, it arrives as early as April 16. (See group, second floor).

***Barn Swallow** (*Hirundo erythrogaster*). A common summer resident and abundant fall migrant. It arrives about April 20 and remains until October 1.

***Tree Swallow** (*Iridoprocne bicolor*). Arrives from the south early in April. There are a few recorded instances of its breeding near New York City, but, generally speaking, it passes northward to more distant nesting grounds. July 1 the birds begin to return from the north, making their home in the marshes of the Hackensack, where, by July 20, they may be found in countless numbers. In the morning they leave their roosts in the "cat-tails" and fly out over the adjoining country to feed. At night they return. Their numbers increase until about September 1, then decrease, and by October 20 only a few stragglers remain.

***Bank Swallow** (*Riparia riparia*). A locally common summer resident, breeding in colonies where the conditions are favorable. It arrives about May 1 and remains until October. (See group, second floor).

Rough-winged Swallow (*Stelgidopteryx serripennis*). This Swallow is locally common in the Lower Hudson River Valley, at Riverdale (Bicknell), Hastings-on-the-Hudson (Rowley), Sing Sing (Fisher); at Highland Falls, which seems to be near the northern limit of its range in the Hudson Valley, it is a rare summer resident (Mearns). I have seen it near Ramapo, N. Y., and with J. Dwight, Jr., found a small colony breeding at Port Jervis, N. Y. It breeds near New Haven, Connecticut, in small numbers, and is rare as far north as Hartford (Sage). On Long Island it is of rare and irregular occurrence (Dutcher).

FAMILY AMPELIDÆ. WAXWINGS, ETC.

Bohemian Waxwing (*Ampelis garrulus*). This species occurs here only as an exceedingly rare and irregular winter visitant. There are no recent records

***Cedar Waxwing; Cedarbird** (*Ampelis cedrorum*). A common summer resident; occurring irregularly in the winter.

FAMILY LANIIDÆ. SHRIKES.

***Northern Shrike; Butcherbird** (*Lanius borealis*). A more or less regular but rather uncommon winter resident.

FIG. 29. NORTHERN SHRIKE.

Migrant Shrike (*Lanius ludovicianus migrans*). The Migrant Shrike is found here is a rare but regular migrant during April, the latter part of August and in September, and, rarely, until December. It has been known to breed but once, at Sing Sing, N. Y., where a fledgeling was taken June 16, 1877 (Fisher, Bull. N. O. C., IV, 1879, p. 61).

FAMILY VIREONIDÆ. VIREOS.

***Red-eyed Vireo** (*Vircosylva olivacea*). This is one of our abundant summer residents. It arrives from the south about May 8 and remains until October. (See group, third floor).

Philadelphia Vireo (*Vircosylva philadelphica*). A very rare migrant.

***Warbling Vireo** (*Vircosylva gilva*). A common summer resident of local distribution, arriving early in May. (See group, third floor).

***Yellow-throated Vireo** (*Lanivireo flavifrons*). A common summer resident, arriving about May 7 and remaining until the latter part of September.

***Blue-headed Vireo** (*Lanivireo solitarius*). A not uncommon migrant, passing northward during the latter part of April and first part of May, and returning late in September.

***White-eyed Vireo** (*Vireo noveboracensis*). A common summer resident about New York City. It reaches us from the south about May 7, and remains until early October. (See group, third floor).

FAMILY MNIOTILTIDÆ. WOOD-WARBLERS.

***Black and White Warbler** (*Mniotilta varia*). A rather common summer resident and common migrant. It appears the latter part of April and is with us until the first part of October. (See group, third floor).

Prothonotary Warbler (*Protonotaria citrea*). Eastern North America, breeding from the Gulf States to southern Illinois and Virginia, and wintering in the tropics. Its occurrence near New York City is accidental; there are but two records, viz., a male shot at Jamaica, L. I. (Dutcher, Auk, X, 1893, p. 276), and a male seen by E. P. Bicknell near the northern limit of New York City, June 2, 1895 (Auk, XII, 1895, 306). Dutcher has recorded a specimen which struck the Montauk Point Lighthouse, August 27, 1886 (Auk, V, 1888, p. 182).

***Worm-eating Warbler** (*Helmitheros vermivorus*). This bird is one of our rarer summer residents, though it is not uncommon some years in the early fall migration. In the Hudson River Valley it is regularly found as far north as Highland Falls (Mearns) and occurs at Fishkill (Stearns). In Connecticut it breeds at Saybrook and New Haven, but is not common, and at Portland it has been taken only twice (Sage). On Long Island it is considered exceedingly rare (Dutcher).

***Blue-winged Warbler** (*Helminthophila pinus*). This species arrives early in May and remains until September 1. It is a common summer resident of the Lower Hudson Valley, at least as far north as Highland Falls (Mearns). In Connecticut it is common at Saybrook and New Haven, but is rare as far north as Portland, where but one or two pairs breed each season (Sage). On Long Island it is known to breed only along the north shore, where it is probably not uncommon in favorable localities. Mrs. E. G. Britton records the occurrence of an individual of this species in Bronx Park in January, 1900 (Bird-Lore, II, 1900, p. 26; see also Noble, Bird-Lore, II, 1900, p. 59). (See group, third floor).

Brewster's Warbler (*Helminthophila leucobronchialis*) with us is a rare but regular summer resident in northern New Jersey, the Lower Hudson Valley and southern Connecticut, but has been taken only once on Long Island (Howell). Specimens have been recorded from Morristown (Thurber), Maplewood (Riker), and Englewood, N. J., where it has been found nesting (Chapman, Auk, IV, 1887, p. 348; IX, 1892, p. 302). Farther north in the Hudson Valley it has been found at Nyack (Bicknell), and at Sing Sing five specimens have been secured (Fisher, Bull. N. O. C., IV, 1879, p. 234; VI, 1881, p. 245; Auk, II, 1885, p. 378) In the Lower Connecticut Valley this bird seems to be more frequent than in any other part of its range. It has been found at Saybrook, Seymour, New Haven, Portland and other localities, the principal records being as follows: Eames, Auk, V, 1888, p. 427; VI, 1889, p. 305; Bishop, Auk, VI, 1889, p. 192; Sage, Auk, X, 1893, p. 208. Probably not more than one-third of all the specimens recorded are typical *leucobronchialis*, the remaining two-thirds presenting every stage of intergradation between this bird and typical *H. pinus*.

Lawrence's Warbler (*Helminthophila lawrencei*) is a much rarer bird than the preceding. There are records for only six specimens from the immediate vicinity of New York City, viz. Chatham, N. J. (Herrick), Hoboken, N. J. (Lawrence), Rye, N. Y. (Vorhees, Auk, V, 1888, p. 427), Greenwich, Conn. (Vorhees, Auk, XI, 1894, p. 259), Cold Spring Harbor, L. I. (Braislin, Auk, XX, 1903, p. 53), and New York Zoological Park, where a male was found breeding with a female *pinus* (Bildersee, Bird Lore, VI, 1904, p. 131; Beebe, Auk, XXI, 1904, p. 387).

The status of both Brewster's and Lawrence's Warblers is still unsettled. They are generally considered to be hybrids between *H. pinus* and *H. chrysoptera*, and it has also been suggested that dichromatism may play a part in producing their coloration. Their relationship will be found discussed under the following references: Brewster, Bull. N. O. C., VI, 1881, p. 218; Ridgway, Auk, II, 1885, p. 359; Manual N. A. Birds, 1887, p. 486; Birds of North and Middle America, II, 1902, pp. 452, 453; Thayer, Auk, XIX, 1902, p. 401; Bishop, Auk, XXII, 1905, p. 21).

***Golden-winged Warbler** (*Helminthophila chrysoptera*). In the immediate vicinity of New York City, this bird occurs as a rather rare spring migrant, but in the early southward migration, in August, it is sometimes not uncommon. It has been found nesting at Nyack, N. Y. (Brownell) and probably breeds regularly from that point northward.

***Nashville Warbler** (*Helminthophila rubricapilla*). This species is here a rather common migrant and a rare summer resident as far south as Highland Falls. It arrives about May 10 and returns on its southward journey during late August, the last migrants being seen about September 25. A breeding female was taken by Chapman at Englewood, N. J., June 16, 1887. (Auk, VI, 1889, p. 304).

Orange-crowned Warbler (*Helminthophila celata*). This Warbler occurs here as an exceedingly rare migrant. There are records of only six specimens, all but one of which occurred in the fall. (Howell, Auk, X, 1893, p. 91).

***Tennessee Warbler** (*Helminthophila peregrina*). With us this bird is a rather rare spring migrant but is sometimes not uncommon in the fall. It passes northward early in May and returns on its southward journey in September.

***Northern Parula Warbler** (*Compsothlypis americana usneæ*). The Parula Warbler is here a more or less abundant migrant and local summer resident. It arrives from the south about May 7 and the last individuals are observed in early October.

***Cape May Warbler** (*Dendroica tigrina*). This is one of our rarest spring migrants, passing northward about May 15. In the fall migration immature birds are sometimes not uncommon.

***Yellow Warbler** (*Dendroica æstiva*). A common summer resident. It arrives from the south about May 5 and remains until September. (See group, third floor).

*Black-throated Blue Warbler (*Dendroica cærulescens*). A common migrant, passing northward early in May and returning in September.

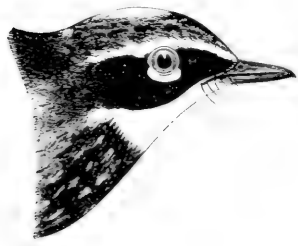


FIG. 30. MYRTLE WARBLER.

*Myrtle Warbler; Yellow-rumped Warbler; (*Dendroica coronata*). An abundant migrant in our vicinity and in favorable localities where bayberries are abundant, it passes the whole winter. Migrants begin to arrive in early April, and the southward migration takes place during the latter part of September and October.

*Magnolia Warbler (*Dendroica maculosa*). In this vicinity it is a common migrant, passing northward early in May and returning late in August and in September.

Cerulean Warbler (*Dendroica cerulea*). Breeds in the Mississippi Valley as far north as Minnesota, and eastward as far as Cayuga Co., N. Y., and winters in the tropics. Its occurrence here is accidental, and there are but three records of its capture, one of a male taken in Kings County, L. I., (Dutcher, Auk, X, 1893, p. 277), of a male taken at Highland Falls, May 17, 1875 (Mearns, Birds Hudson Highlands, p. 154), and one of a specimen taken at Boonton, Morris Co., N. J., in September, 1887 (Judd, Auk, XIV, 1897, p. 326).

*Chestnut-sided Warbler (*Dendroica pensylvanica*). With us it is a common migrant, and, in recent years, has become a locally common summer resident. It arrives early in May, and the return migration occurs between August 10 and October 1.

*Bay-breasted Warbler (*Dendroica castanea*). As a rule the Bay-breasted is one of our rarest transient Warblers but during some seasons it is found in numbers. It passes northward about the middle of May and returns in September.

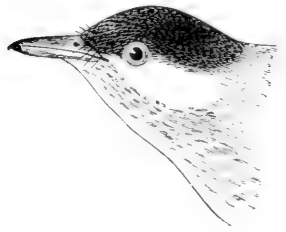


FIG. 31. BLACKPOLL WARBLER.

*Blackpoll Warbler (*Dendroica striata.*) The Blackpoll is one of our most abundant migrants and is the last of the transient Warblers to pass northward in the spring. It arrives from the south about May 7 and returns on its southern journey in September.

*Blackburnian Warbler (*Dendroica. blackburniæ*). A rather uncommon spring migrant, passing northward during the first of May, but is not uncommon some year during its return migration in September.

Yellow-throated Warbler (*Dendroica domina*). Southern United States, breeding as far north as Virginia and wintering from Florida southward. There is but one record of the occurrence of this southern species near New

York City. It is based on the capture of a male in Kings County, L. I. (Dutcher, Auk, X, 1893, p. 277).

*Black-throated Green Warbler (*Dendroica virens*). In the immediate vicinity of New York City this bird is found chiefly as a migrant, arriving from the south late in April and returning about the middle of August. It is known to breed at Highland Falls, N. Y. (Mearns), Bridgeport, Conn. (Averill), Millers Place, L. I. (Dutcher, MS), and at Demarest, N. J., where on June 5, 1904, B. S. Bowdish found a nest built in a skunk cabbage about fourteen inches from the ground (Auk, XXIII, 1906, p. 17).

*Pine Warbler (*Dendroica vigorsi*). This Warbler is of local distribution in this vicinity. In northern New Jersey, the Lower Hudson Valley and southern Connecticut it occurs only as a rare migrant, but on certain parts of Long Island, where the scrub pines afford it congenial surroundings, it is not uncommon and breeds.

Palm Warbler (*Dendroica palmarum*). This species is of rather rare but regular occurrence here. One specimen was taken at Sing Sing, N. Y., April 29, 1882 (Fisher, Bull. N. O. C., VII, 1882, p. 249), two at Riverdale, N. Y., in the spring of 1877 (Bicknell, Bull. N. O. C., V, 1880, p. 182), and one struck the Fire Island Lighthouse, September 23, 1887 (Dutcher, Auk, V, 1888, p. 182). Braislin (Auk, XIX, 1902, p. 149) records it as "common" near Brooklyn between September 25 and October 7, 1895, and Miller (Bird-Lore, V, 1903, p. 199) states that it was rather common near Plainfield, N. J., between September 22 and October 4, 1903.

*Yellow Palm Warbler; Yellow Redpoll (*Dendroica palmarum hypochrysea*). A common migrant arriving from the south about April 10, and returning late in September and in October.

*Prairie Warbler (*Dendroica discolor*). The distribution of the Prairie Warbler in this vicinity is much like that of the Pine Warbler. It is rare in northern New Jersey and the Lower Hudson Valley, where however, it has been found breeding once (Highland Falls, Mearns), but is not uncommon on some parts of Long Island. At Bridgeport, Conn., it is a common migrant and may breed (Averill). (See group, third floor).

Fig. 32. Ovenbird.

*Ovenbird (*Sciurus aurocapillus*). The Ovenbird is one of our abundant summer residents, arriving about May 1 and remaining until the middle of October. (See group, third floor).

* Northern Water-thrush (*Sciurus noveboracensis*). A common migrant, passing northward during May and returning about September 1. Cherrie (Auk, XIX, 1902, p. 210) records the probable breeding of this species at Cold Spring Harbor, L. I.

LOUISIANA WATER THRUSH
Group, Hall No. 308

Grinnell's Water-thrush (*Sciurus noveboracensis notabilis*). Western North America; eastward during the migrations to Virginia and South Atlantic States. This western species has been recorded only from Raritan, N. J., May 30, 1889 (Southwick, Auk, IX, 1892, p. 303), and Princeton, N. J. Sept. 10, 1879 (Babson).

Louisiana Water-thrush (*Sciurus motacilla*). It is a common summer resident in the lower Hudson Valley, where it has been found as far north as Lake George (Fisher), and is not uncommon in the lower Connecticut Valley. There are two records for Massachusetts and two for Rhode Island. On Long Island it is very rare (Dutcher). (See group, third floor).

FIG. 33. KENTUCKY WARBLER.

***Kentucky Warbler** (*Opornis formosa*). This is a common summer resident on the banks of the Lower Hudson River and has been recorded from Fort Lee and Riverdale (Bicknell), Englewood (Chapman), and Sing Sing (Fisher), beyond which point it is as yet unknown. In Connecticut there are but three records, viz: at Suffield where a male was taken August 16, 1876 (Merriam), at Greenwich, where a pair and a fledgeling were seen and the male taken July 10, 1892 (Vorhees, Auk, X, 1893, p. 86) and at West Stratford, where a male was shot May, 30, 1888 (Lucas, Orn. and Ool., XIV, 1889, p. 62). On Long Island it is very rare, there being but one recent record if its occurrence (Dutcher). It is wholly absent in the vicinity of Plainfield, N. J., (Miller) and at Princeton (Babson).

Connecticut Warbler (*Oporornis agilis*). This species is an exceedingly rare spring migrant east of the Alleghanies, and I know of no record of its occurrence here at that season; in the fall, however, it is not uncommon, and sometimes is abundant, arriving as early as September 3 and remaining until the latter part of the month.

***Mourning Warbler** (*Oporornis philadelphia*). This species is one of our rare Warblers; it passes northward during the latter half of May.

***Northern Yellowthroat** (*Geothlypis trichas brachidactyla*). One of our most abundant summer residents. It arrives about May 5 and remains until October. (See group, third floor.)

Yellow-breasted Chat (*Icteria virens*). A common summer resident, arriving about May 5 and remaining until September.

***Hooded Warbler** (*Wilsonia mitrata*). The Hooded Warbler is here near the northern limit of its range. At Englewood, N. J., it is an abundant summer resident, arriving about May 5 and remaining until the middle of September. At Riverdale, N. J., it is locally common (Bicknell), at Sing Sing it is not common (Fisher), but at Highland Falls it is "very common" (Mearns). It has been taken at Fishkill, the most northern point in the

Hudson River Valley from which it has been recorded. In Connecticut it is common at Saybrook and New Haven, but is rare north of these points (Sage). In Massachusetts it has been found only twice. On Long Island it is rare. At Plainfield and Princeton, N. J., it is a rare migrant.

*Wilson's Warbler (*Wilsonia pusilla*). This bird is here a rather uncommon spring migrant, passing northward from the 12th to the 30th of May, but is not uncommon at times during its return journey, which takes place between August 15 and September 15.

*Canadian Warbler (*Wilsonia canadensis*). A common migrant, passing north from May 10 to June 10 and returning between August 5 and September 10.

*American Redstart (*Steophaga ruticilla*). A common summer resident of our woodland; it arrives about May 5 and remains until early October. (See group, third floor.)

FAMILY MOTACILLIDÆ. WAGTAILS.

*American Pipit; Titlark (*Anthus pensilvanicus*). The Titlark is a generally common, and, along our coasts, an abundant migrant. It travels northward from the latter part of March to early May and returns on its southern journey during October and November.

FAMILY MIMIDÆ. MOCKINGBIRDS, THRASHERS, ETC.

*Mockingbird (*Mimus polyglottos*). Breeds from the Bahamas and Mexico to southern Illinois and northern New Jersey, rarely to Massachusetts, and winters from North Carolina southward. The Mockingbird is of rare occurrence in this vicinity and doubtless many of the specimens reported are escaped cage-birds. It has, however, been found breeding at several localities, and at Tenafly, N. J., a pair returned to the same locality for several years (Auk, VI, 1889, p. 305). On several occasions Mockingbirds have been found here during the winter and have shown their ability to withstand our coldest weather as long as they can obtain an abundance of food.

*Catbird (*Galeoscoptes carolinensis*). An abundant summer resident, arriving about May 3 and remaining until October 20. (See group, third floor.)

*Brown Thrasher (*Toxostoma rufum*). A common summer resident, appearing about April 20 and remaining until the middle of October and occasionally later. (See group, second floor.)

FAMILY TROGLODYTIDÆ. WRENS.

*Carolina Wren (*Thryothorus ludovicianus*). Eastern United States, breeding from the Gulf States to southern Iowa, northern Illinois, and southern Connecticut; resident, except at the northern limit of its range. Generally speaking the Carolina Wren is a rather rare bird in this vicinity but on the

FIG. 34. CAROLINA WREN.

eastern slope of the Palisades, as far north as Piermont, N. Y., it is common during the summer (Chapman, Auk, X, 1893, p. 87). It has been found on Long Island in the winter (Dutcher, MS). Since the above was written, in 1894, this species appears to have increased in numbers, locally.

*House Wren (*Troglodytes aedon*). This common and familiar species comes to us about May 1 and remains until October.

*Winter Wren (*Olbiorchilus hiemalis*). Just before the House Wren leaves us, or about October 1, the Winter Wren comes from the north and is not uncommon until the House Wren returns in May.

Short-billed Marsh Wren (*Cistothorus stellaris*). This species is here a common summer resident of very local distribution.

FIG. 35. WINTER WREN.

Long-billed Marsh Wren (*Telmatodytes palustris*). This abundant inhabitant of our reedy marshes arrives in May and remains until October or November.

FAMILY CERTHIIDÆ. CREEPERS.

***Brown Creeper** (*Certhia familiaris americana*). The Creeper is here a rather common winter resident, arriving from the north about October 1 and remaining until April.

FAMILY SITTIDÆ. NUTHATCHES.

***White-breasted Nuthatch** (*Sitta carolinensis*). A common permanent resident.

***Red-breasted Nuthatch** (*Sitta canadensis*). This bird is sometimes common from the later part of August to October and occasionally remains during the winter.

FIG. 36. RED-BREASTED NUTHATCH.

FAMILY PARIDÆ. TITMICE.

Tufted Titmouse (*Bæolophus bicolor*). This bird is resident and breeds as far north as Orange, N. J. (Riker), and Staten Island, N. Y. (Hollick). Beyond these points it occurs regularly but rarely. It is observed yearly in April at Englewood, N. J. (Chapman). There are few records for Connecticut, and although Giraud leads us to believe it was not uncommon and bred on Long Island when he wrote, it is now very rare there. (Braislin, Auk, XIX, p. 148.)

FIG. 37. CHICKADEE.

***Chickadee** (*Penthestes atricapillus*). The Chickadee is here a common permanent resident, but is more numerous during its migration in October than at other times.

Carolina Chickadee (*Penthestes carolinensis*). "Southeastern United States, north to New Jersey and Illinois." This species reaches the southern limit of our district at Princeton, N. J., where it is a not uncommon resident, while *P. atricapillus* is found there only in the winter (Babson).

FAMILY SYLVIIDÆ. KINGLETS AND GNATCATCHERS.

***Golden-crowned Kinglet** (*Regulus satrapa*). A not common winter resident in favorable localities; it arrives from the north about October 1 and remains until May.

FIG. 38. GOLDEN-CROWNED KINGLET.

***Ruby-crowned Kinglet** (*Regulus calendula*). A common spring, and an abundant fall migrant, arriving from the south about the middle of April and returning late in September.

***Blue-gray Gnatcatcher** (*Polioptila cærulea*). Eastern United States, breeding from the Gulf States to northern Illinois, southern Ontario and northern New Jersey, and wandering rarely to Minnesota and Maine, winters from Florida southward. There are numerous records of capture of this southern species in the vicinity of New York City, but it is not known to occur regularly nearer than Princeton, N. J., where it arrives from "April 25 to May 1" (Scott, The Country, I. 1878, p. 354).

Townsend's Solitaire (*Myadestes townsendi*). A male of this species was taken at King's Park, L. I., November 25, 1905, by J. A. Weber (Dwight, Auk, XXIII, 1906, p. 105).

***Wood Thrush** (*Hylocichla mustelina*). The Wood Thrush is an abundant summer resident, arriving about May 1 and remaining until early October. It

may rightly claim to rank as the most gifted of our summer songsters. (See group, second floor.)

* **Wilson's Thrush** (*Hylocichla fuscescens*). Wilson's Thrush, or the Veery, as it is better called, is a common summer resident, arriving about May 1 and remaining until September. (See group, third floor.)

* **Gray-cheeked Thrush** (*Hylocichla aliciæ*). A common migrant, passing northward in May and southward in September and October.

Bicknell's Thrush (*Hylocichla bicknelli*). So far as records go, this is a rather rare migrant, occurring in May and September and October, but careful search will doubtless show it to be more common than is generally supposed.

* **Olive-backed Thrush** (*Hylocichla ustulata swainsoni*). The Olive-backed Thrush is a common migrant in this vicinity. It passes northward in May and southward in September and October.

* **Hermit Thrush** (*Hylocichla guttata pallasi.*) An abundant migrant and occasionally is found in small numbers during the winter. In the spring it passes northward between April 10 and May 1; its fall migration takes place between October 1 and November 1. There is a record of its probable breeding at Lake Ronkonkoma, L. I. (Dutcher, Auk, III, 1886, p. 443).

* **American Robin** (*Merula migratoria*). The Robin is our most abundant summer resident, and in favorable localities a few may be found in the winter Migrants begin to arrive toward the last of February, and the species is abundant until December. (See group, third floor.)

Varied Thrush (*Ixoreus nævius subsp. ?*). The local status of this Pacific coast bird appears to be well stated in Coues' "Birds of the Colorado Valley," where George N. Lawrence is quoted as follows:

"Besides Cabot's New Jersey example, two others have been procured near New York City—one at Islip, Long Island, shot in the fall, in company with Robins, and now in the possession of the person who secured it, the other at Hoboken, New Jersey. Both were received in the flesh by Mr. J. Akhurst, to be mounted; the Hoboken one was subsequently destroyed by fire in the taxidermist's workshop. All the specimen's in my own cabinet came from the Pacific side."

The Cabot specimen mentioned above by Lawrence is possibly the one referred to by Turnbull (Birds of East. Penn. and N. J.), but without data.

Wheatear (*Saxicola œnanthe leucorhoa*). This northern species is of accidental occurrence in this vicinity; it has been twice recorded from Long Island (Lawrence, Ann. Lyc. Nat. Hist., VIII, 1886, p. 282; Dutcher, Auk, X, 1893, p. 277.)

* **Bluebird** (*Sialia sialis*). The Bluebird is here a common summer resident, an abundant migrant, and not infrequent winter resident. Migrants begin to arrive from the south early in March.

THE AMERICAN ROBIN
Group, Hall No. 308

List of
Principal Papers Relating to the Birds of the Vicinity of New York City.

1844. De Kay, J. E. Zoology of New York, or the New York Fauna; comprising detailed descriptions of all the animals hitherto observed within the State of New York, with brief notices of those occasionally found near its borders, and accompanied by appropriate illustrations. Part II, Birds. Albany: 1 Vol., 4 to, pp. xii, 380, pll. col'd, 141.

Treats of 308 species. "Though still constantly quoted—and properly to be referred to—it has ceased to be regarded as an authority" (Coues).

1844. Giraud, J. P., Jr. The Birds of Long Island....New York: published by Wiley & Putnam, 161 Broadway....1 Vol., 8vo., pp. i—xxiv, 1—397.

Treats of 286 species, giving descriptions and extended annotations. Only 200 copies of this work are supposed to have been placed in circulation.

1866. Lawrence, G. N. Catalogue of Birds observed on New York, Long, and Staten Island and the adjacent parts of New Jersey. Ann. Lyc. Nat. Hist., New York, VIII, pp. 279—300.

A partly annotated list of 327 species.

1868. Abbott, C. C. Catalogue of Vertebrate Animals of New Jersey. Cooke's Geology of New Jersey. Appendix E. Birds, pp. 761—798.

An annotated list of 301 species, abounding in errors and only to be used with discrimination.

1869. Turnbull, W. P. The Birds of East Pennsylvania and New Jersey. Glasgow, Printed for Private Circulation.

1876. Bicknell, E. P. Field Notes at Riverdale. Forest and Stream, VI, p. 233; also pp. 133, 148, 386, 402.

Winter and spring notes on numerous species.

1876. Stevens, W. G. Bird arrivals on the Harlem. Forest and Stream, VI, p. 215.

Notes on 40 species.

1877. Merriam, C. Hart. A Review of the Birds of Connecticut with Remarks on Their Habits. Trans. Conn. Acad., IV, pp. 1—165.

A fully annotated list of 292 species.

1877. Stevens, W. B. [Arrivals of Birds at West Farms, N. Y., during the springs of 1874, 1875, and 1876.] Forest and Stream, VIII, p. 400.

Dates of arrival of 32 species.

1878. Benner, F. Bird Notes from Long Island. Forest and Stream, X, pp. 174, 215.

Notes from Astoria on a number of species.

1878. Bicknell, E. P. Evidences of the Carolinian Fauna in the Lower Hudson Valley, Principally from Observations taken at Riverdale, N. Y. Bull. Nutt. Orn. Club, III, pp. 128—132.

On 13 Carolinian species. (See also Allen, J. A. *ibid.*, pp. 149, 150.)

1878. Huyler, A. I. Winter Birds on the Hackensack. The Country, I, p. 149.

1878. Lawrence, N. T. Notes on several rare Birds taken on Long Island. Forest and Stream, X, p. 235.

Notes on 24 species.

1878. Winkle, N. [Spring Birds at Summit, N. J.] The Country, II, p. 57.

1879. Coues, G. H. List of Birds observed in the Naval Hospital Grounds, in Brooklyn City. Bull. Nutt. Orn. Club, IV, pp. 31—33.

Brief notes on 60 species.

1879. Herrick, H. Notes on some Birds of Chatham, N. J. Forest and Stream, XII, p. 165.

1879—80. Mearns, E. A. A list of the Birds of the Hudson Highlands. Bull. Essex (Mass.) Inst., X, pp. 166—179; XI, 43—52, 154—168, 189—204; XII, 11—25, 109—128; XIII, 75—93.

One of the best and most complete of our local papers, treating fully of 209 species. (See also an Addendum adding 5 species in The Auk, VII, 1890, pp. 55, 56; also reviews in Bull. Nutt. Orn. Club, V, 1880, p. 175; VI, 1881, p. 172.)

1879. Nichols, G. N. Migration of some Warblers through Summit, N. J., during the last spring. Forest and Stream, XII, p. 464.

Notes on 18 species.

1879. Roosevelt, T. Notes on some of the Birds of Oyster Bay, Long Island. One-page leaflet, published by the author.

Notes on 17 species.

1879. Scott, W. E. D. Late Fall and Winter Notes on some Birds Observed in the Vicinity of Princeton, N. J., 1878—79. Bull. Nutt. Orn. Club, IV, pp. 81—85.

Notes on 35 species.

1879—85. Fisher, A. K. Occurrence of Several rare Birds near Sing Sing, N. Y. Bull. Nutt. Orn. Club, IV, pp. 61, 62.

Notes on 5 species. For additional notes by the same author on the rarer birds of Sing Sing, see *ibid.*, III, 1878, pp. 191, 192; IV, 1879, p. 234; VI, 1881, p. 245; VII, 1882, pp. 249, 251; VIII, 1883, pp. 121, 180; Auk, II, 1885, pp. 306, 378.

1880. Lawrence, R. Notes on some of the Rarer Birds of Long Island, N. Y. Bull. Nutt. Orn. Club, V, pp. 116, 117.

Notes on 8 species.

1880. Stearns, W. A. List of Birds of Fishkill-on-Hudson, N. Y. 8vo., pp. 16. Published by the author.

A briefly annotated list of 138 species. (Review in Bull. Nutt. Orn. Club, V, 1880, p. 233.)

1881. BERIER, DE L. Notes on a few Birds Observed at Fort Hamilton, Long Island, N. Y. Bull. Nutt. Orn. Club, VI, pp. 11—13.

Brief notes on 10 species.

1881. BERIER, DE L. Notes on Birds Rare or Accidental on Long Island, N. Y. Bull. Nutt. Orn. Club, VI, pp. 125, 126.

Notes on 11 species.

1882. TOWNSEND, A. L. [Arrival of Birds in spring at Bay Ridge, L. I.] Forest and Stream, XVIII, pp. 305, 346, see also p. 427.

Notes on some 30 species.

1884. BARREL, H. F. Arrivals of Birds in [New Providence], N. J., in 1883. Orn. and Oöl, IX, p. 45.

A chronological list of 73 species.

1884. DUTCHER, W. Bird Notes from Long Island, N. Y. Auk, I, pp. 174—179.

On birds striking the Fire Island and Shinnecock Bay Lighthouses.

1884—5. BICKNELL, E. P. A Study of the Singing of our Birds. Auk, I, pp. 60—71, 126—140, 209—218, 322—332; II, 1885, pp. 144—154, 249—262.

On the song-seasons of about 100 species from observations made principally at Riverdale, N. Y.

1884—89. DUTCHER, W. Bird Notes from Long Island. Auk, I, pp. 31—35; II, 1885, pp. 36—39; III, 1886, pp. 432—444; V, 1888, pp. 169—183; VI, 1889, pp. 131—139; X, 1893, pp. 265, 266.

A series of papers on the rarer birds of Long Island, treating of, in all, 71 species.

1885. BARRELL, H. F. Birds of the Upper Passaic Valley, New Jersey. Orn. and Oöl., X, pp. 21—23, 42, 43.

A briefly annotated list of 149 species.

1885. HOLLICK, A. Preliminary List of the Birds known to breed on Staten Island. Proc. Nat. Sci. Assoc., Staten Island. Extra No. 4, December.

A nominal list of 67 species.

1885. LAWRENCE, N. T. Long Island, N. Y., Bird Notes. Auk, II, pp. 272—274.

Notes on 18 species.

1886. PAINE, A. G., JR. Dates of the Arrival of Migratory Birds in the spring of 1886, Central Park, New York City. Orn. and Oöl, XI, pp. 109, 125.

A chronological list of 64 species.

1886. WOODRUFF, L. B. AND PAINE, A. G., JR. Birds of Central Park, New York [City]. A preliminary List. Forest and Stream, XXVI, pp. 386, 387; see also p. 487.

A briefly annotated list of 121 species.

1887. THURBER, E. C. A List of Birds of Morris County, New Jersey. True Democratic Banner (newspaper), Morristown, N. J., Nov. 10, 17, 24.

An annotated list of 205 species. (Review in Auk, V, 1888, pp. 421, 422.)

1888. HALES, H. Bird Notes of Northern New Jersey. Orn. and Oöl., XIII, p. 158.

Notes on the spring migrations at Ridgewood, N. J.

1889. CHAPMAN, F. M. Notes on Birds Observed in the Vicinity of Englewood, N. J. Auk, VI, pp. 302—305.

Notes on 19 species.

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1892. CHAPMAN, F. M. [Birds of Central Park, New York City.] New York Evening Post, Supplement, June 18, 25, July 2, Oct. 15, Dec. 31.

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1892. HOWELL, A. H. Brief notes from Long Island. Auk, IX, pp. 306, 307.

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1893. DUTCHER, W. Notes on some Rare Birds in the Collection of the Long Island Historical Society. Auk, X, pp. 267—277.

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1893. EAMES, E. H. Notes from Connecticut. Auk, X, pp. 89, 90, 209.
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1893. FOSTER, L. S. The Winter Birds of the Vicinity of New York City. Abst. Proc. Linnæan Society, No. 5, pp. 1—3.
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1893. HOWELL, A. H. On the Occurrence of three Rare Birds on Long Island, New York. Auk, X, 1893, pp. 90, 91.
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1894. CHAPMAN, F. M. The Nocturnal Migration of Birds. Popular Science Monthly, XLV, pp. 506—511.
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1894. STONE, WITMER. The Birds of Eastern Pennsylvania and New Jersey, With Introductory Chapters on Geographical Distribution and Migration; prepared under the direction of the Delaware Valley Ornithological Club.
A complete and fully annotated list of 352 species. Contains also a Bibliography of the Birds of Pennsylvania and New Jersey.

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Contains tables giving dates of migration at Englewood, N. J., by F. M. Chapman, and one giving dates at which birds begin to nest in the vicinity of New York City. Also notes under each species showing its status at Sing Sing, N. Y., and on Long Island, by A. K. Fisher and Wm. Dutcher, respectively, constituting complete lists for these localities.

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Notes on 5 species.

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1904. STONE, WITMER. Report on the Spring Migration of 1904 in eastern Pennsylvania and New Jersey. Cassinia, 1904, pp. 46—61.

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1904. CHAPMAN, FRANK M. Birds' Nests and Eggs, With an Annotated List of the Birds Known to Breed Within Fifty Miles of New York City. A Guide Leaflet to the Collection in the American Museum of Natural History. Guide Leaflet No. 14. Supplement to the American Museum Journal. Vol. IV, No. 2, April, 1904. New York: Published by the Museum. Illustrated.

Includes descriptions of nesting site, and number and color of eggs.

1904. BRAISLIN, W. C. Notes concerning certain Birds of Long Island, N. Y. Auk, XXI, pp. 287—289.

Notes on 9 species.

1905. BRAISLIN, W. C. Notes concerning certain Birds of Long Island, N. Y. Auk, XXI, pp. 167—169.

Notes on 15 species.

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Records 149 species. Briefly annotated.

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An annotated list of 89 species.

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Records 161 species. Annotated.

1906. BOWDISH, B. S. Some Breeding Warblers of Demarest, N. J. Auk, XXIII, pp. 16—19.

Notes on breeding of eleven species.

ADVANCE TROOP OF THE TJADER EXPEDITION CROSSING THE ATHI RIVER

The American Museum Journal

VOL. VI. OCTOBER, 1906. NO. 4

BRIEF REPORTS FROM RETURNED EXPEDITIONS.

I.—THE EXPEDITION TO COLORADO FOR FOSSIL INSECTS.

THERE are three localities famous among paleontologists for the great number of tertiary fossil insects they have yielded: Œningen in Bavaria, Radoboj in Croatia, and Florissant in Colorado. Although the specimens found in the European localities are, as a rule, somewhat better preserved, the number and variety of those found at Florissant are much greater. Thus Scudder, our leading authority on fossil insects, found in the latter locality "in a single summer more than double the number of specimens which the famous localities at Œningen in Bavaria furnished Heer in thirty years." Moreover, the quarries at Florissant are "fifty times as extensive and far more easily worked." Besides an enormous number of plant remains, such as leaves, seeds, twigs, flowers, buds, etc., remains of molluscs, spiders, fishes and birds have also been taken in this locality. The vast collections made by Scudder were described in a series of important papers and monographs beginning in 1876 and terminating in 1900, when a serious illness overtook the talented entomologist and prevented him from continuing his monumental work. Much undescribed material still remains in our large museums.

The credit for having revived an interest in Florissant is due to Judge Junius Henderson and Professor T. D. A. Cockerell, both of the University of Colorado. The former gentleman organized an expedition to Florissant during the summer of 1905 and secured large and valuable collections for the University Museum. Professor T. D. A. and Mrs. W. P. Cockerell maintained a temporary laboratory at Florissant during the past

June and July and kindly invited the author to coöperate with them in securing a collection for the American Museum and in distributing the material to specialists for study and publication in the "Museum Bulletin." The summer's work was successful beyond expectation. Upwards of 2,000 specimens were secured, largely with the assistance of Mrs. W. P. Cockerell and Mr. Sievert A. Rohwer, who were indefatigable in carrying on the

VIEW OF THE ANCIENT MIOCENE LAKE-BED AT FLORISSANT, COLORADO, LOOKING NORTH

work of excavating and preserving the often very fragile plant and insect remains. Professor Cockerell has undertaken to study the plants, of which some 50 new species were found, and the author will describe the ants, which comprise some 800 specimens. Although these are the most abundant of all insects at Florissant they have never been studied. Mr. A. L. Melander has promised to describe the flies (Diptera), and Mr. C. T. Brues the smaller Hymenopterous insects. It is hoped that Mr. C. Schaeffer of

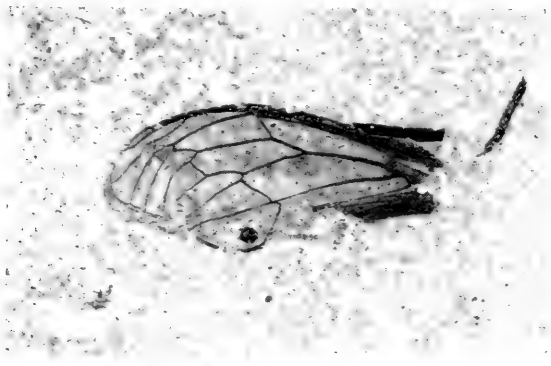
the Brooklyn Institute may be willing to undertake a study of the beetles (Coleoptera), of which a fine series was secured.

The fossiliferous formations at Florissant are shales forming the bed of a shallow lake of unknown age, but probably Miocene, and long since drained by upheaval and distortion. The climate of the region about Florissant at that remote period, to judge from the character of the fossils, was similar to that of the Gulf

FOSSIL STUMP OF SEQUOIA TREE NEAR FLORISSANT, COLORADO

States at the present time. There was a rank growth of huge Sequoias, long-leaved cotton-woods, Planera, rushes and ferns around this placid body of water. Some of the fossilized stumps of the Sequoias may still be seen near the point where Scudder made his excavations. Insects swarmed in the vegetation and were carried out into the lake by the wind, rain and small streams, and drowned in great numbers. Their tiny bodies sank to the bottom and were gradually entombed in fine ashes, mud and sand. The ashes were of volcanic origin and must have been

deposited at different times, so that we must assume the presence of intermittent volcanoes somewhere in the neighborhood of the lake. The different strata, which have evidently been produced by the assorting action of the sluggish lake currents, are often as thin as paper and are not equally fossiliferous. In fact, it is often necessary to remove great masses of shale and sandstone before coming on a rich fossiliferous layer, and this, though often traceable for many square feet, may be only a few inches in thickness. The extremely comminuted nature of the sediment is responsible for the beautiful preservation of many of the plants and insects, which, in the completeness of their detail, remind one of lithographs or delicate etchings.



WING OF A FOSSIL CICADA—(*Lithocicada perita* Ckll.)
Direct reproduction from fossil.

The collections secured by Professor Cockerell and the author show that, although more than 600 species of insects and about 150 species of plants have been described from Florissant, the number still to be unearthed must be enormously greater. One may say, in fact, that only the surface of the vast deposits has been scratched. With few exceptions, the Florissant insects hitherto described, though all belonging to extinct species, are nevertheless very similar to those found in subtropical America at the

UNDESCRIBED SPECIES OF FOSSIL BEETLE (*Meloid*)
Direct reproduction from fossil.

present time. This is an extremely interesting and significant fact, since it emphasizes the enormous age and singular morphological stability and persistence of the insect type. As Quinet says, in a passage quoted by Scudder in the introduction to his "Tertiary Insects of North America": "So fragile, so easy to crush, you would readily believe the insect one of the latest beings produced by nature, one of those which has least resisted the action of time: that its type, genera, its forms, must have been ground to powder a thousand times, annihilated by the revolutions of the globe, and perpetually thrown into the crucible. For where is its defense? Of what value its antennæ, its shield, its wings of gauze, against the commotions and the tempests which change the surface of the earth? When the mountains themselves are overthrown and the seas uplifted, when the giants of structure, the mighty quadrupeds, change form and habit under the pressure of circumstances, will the insect withstand them? Is it which will display most character in nature? Yes! The universe flings itself against a gnat. Where will it find refuge? In its diminutiveness, its nothingness."

W. M. WHEELER.

Planera longifolia, A VERY COMMON LEAF IN THE FLORISSANT SHALES

II.—THE EXPEDITION TO TAHITI.

DURING the late winter and early spring of the present year a research expedition to the island of Tahiti was undertaken by the writer under the auspices of the American Museum of Natural History, with funds contributed anonymously for the purposes of the research. The objects in view were three:

(1) the collection of terrestrial pulmonate gasteropods of the genus *Partula* from as wide an area of the island as possible, for the acquisition of data relating to the geographical distribution of the Tahitian species, and relating to the effect of geographical isolation as a factor in specific evolution; (2) the determination of data relating to the inheritance of various specific characters, such as the color and form of the shell, the direction of the shell's twist, etc.; the viviparous habits of these snails render material collected for the first purpose available also for the second; and (3) the study of the habits of these forms so that living specimens could be brought back to New York and established for extended experiments upon the course of inheritance in pure and mixed breeds.

Leaving San Francisco on February 3, Papeete, the main town of the island of Tahiti, was reached on February 15. It was found on arrival that a terrific cyclone and tidal wave had occurred in that region of the South Seas on February 7 and 8, causing great damage everywhere and great loss of life in the low outlying coral atolls. In Tahiti, the coast roads had been badly washed, making travel uncertain, while in the interior damage to the forests had made many regions quite difficult to explore. These conditions naturally interfered somewhat with the collection of material.

Headquarters were established at Papeete, on the northwestern coast of the island, and during the greater part of the stay of six weeks collecting trips were made from that town as a base. Ten days were spent at Papara, on the south side of Tahiti, the seat of ancient tribal government; and here our hosts, Chief Tati Salmon and his family, offered every facility for the furtherance of the purposes of the expedition.

Geologically the Society Islands consist of a series of volcanic peaks, each surrounded by a more or less complete coral-reef, trending from southeast to northwest. Tahiti and its near neighbor Moorea form the extreme southeastern elements of this range. The island of Tahiti is double, consisting of a main peak twenty miles across, rising to a height of 8,000 feet, and a lesser element about eight miles in diameter, these two being joined by an isthmus of low lands. Each of these elements is cut

radially by more or less regular valleys, some of them being more that a half-mile in width at their mouths, where they debouch upon the low coastal plain of alluvial soil upon which grow the palms and fruit trees characteristic of the tropics. Nearly every one of the eighteen districts of the whole island contains at least one large valley, and often many other lesser valleys, through each of which flows a stream that rises in the higher central part of the island, where the precipitation of rain is almost constant throughout the day. Luxuriant vegetation fills the bottom of each well-watered valley, even up to high barometric levels, and it is upon certain of the plants in the higher and moister parts of the valleys that the Partulæ were to be found. And because of the high and barren intervening ridges certain species are absolutely isolated from their neighbors, while in some cases, where the moist zone extends down quite or almost to the alluvial plain, a certain amount of migration from one valley to another is possible. The facts relating to the connection between geographical isolation and specific differentiation are therefore of the greatest interest.

More than thirty collecting trips were made up the valleys, of which twenty-one were explored, over 400 miles being traveled in their course. Of the 120 miles of coastal circumference, over 70 were covered; of the remainder the peninsula, a uniform region, formed the greater part, and the rest, the northeast part of the island, was practically inaccessible without the expenditure of an inordinate amount of time. The material collected consists of more than ten thousand individuals, adults and adolescents, a number that may rise to twenty thousand when the young are dissected out from the adults. The distance from the sea, the barometric level and other data relating to food plant, etc., were determined in all cases. The snails belong to the species *P. hyalina*, an invariable and widely distributed form; *P. nodosa*, from the southern area, where within recent years it has arisen and spread, at the same time undergoing wide variation; *P. filosa* from a single valley on the northwest side; and the several forms, *amabilis*, *sinistrorsa*, *sinistralis*, *lignaria*, *rubescens* and *crassa*, that are by some regarded as varieties of *P. otaheitana*, still another form, while by others they are regarded as distinct species. For our present purposes, it is the

distribution of these forms that is of primary importance, whether or not their interrelationships be closer than in the case of the first mentioned species.

It is intended to make a statistical examination of the material collected, and of the strength of inheritance in the case o color and form characters as determined by the correlation between the adults and their young. A full report must await such an extended study. Of the live snails, of which there are now more than 8,000, it may be said that the adults are now feeding and producing young, in some cases four months since their collection; the adolescents are also feeding and growing, and, if opportunity permits, will serve for the study of inheritance in direct and hybrid lines.

HENRY EDWARD CRAMPTON.

III.—THE EXPEDITION TO THE BLACKFEET INDIAN RESERVATION.

DURING the past summer the writer made another visit to the Blackfeet Indian Reservation in the United States to secure further information as to the ceremonies and industries of this interesting tribe of Plains Indians. The work was quite successful and the Museum has now a large collection with full ethnological notes covering the whole range of their culture.

A number of interesting survivals of ancient industries were observed. In an out-of-the-way camp some women were dressing cow-skins with broken stones instead of the native-made metal tools now in use. For removing the hair a pebble with a broken edge was used, the stone being held in the hand and a glancing blow delivered upon the skin as it lay upon the ground. While this method requires more time than that employing metal tools, it has an advantage in that the danger of cutting into the texture is avoided. In former times the skin was reduced to the required thickness by scrapers flaked from quartzite boulders.

In another camp an old man gave a demonstration of a type of cooking often employed by the buffalo hunting Indians when on the war-path, a method that may at one time have been the usual manner of cooking. At the demonstration witnessed this

summer, a soup known to the Blackfeet as blood-soup, was boiled in the suspended paunch of a beef by dropping heated stones into the mixture. The stones were heated in a fire of twigs and cow chips. They were carried to the paunch by two sticks, one forked and the other straight; the latter being used to stir the soup as it boiled. In former times the boiling was done in the hide of a buffalo, supported in the manner just described

DEMONSTRATION OF COOKING IN A PAUNCH BY MEANS OF HOT STONES. BLACKFEET INDIAN RESERVATION, MONTANA, 1906

or tucked into a hole in the ground. A great deal of information on other phases of native life was obtained, which will enrich the Museum's exhibit of the Plains Indians.

On the top of a large hill the secret fasting-place of a medicine man was discovered. An oval structure of stones had been erected with an opening to the east. The enclosure was lined with an evergreen resembling wild juniper and was barely large

enough to accommodate an average-sized person in a sitting posture. At one side of the shelter were the remains of an offering to the Sun, consisting of clothing and eagle feathers. On such lonely hilltops men often fast and pray for several days and nights seeking a vision or other signs from the supernatural power. The strong belief that the ghosts of the dead frequent the hill-

SECRET FASTING PLACE ON A LONELY HILL. BLACKFEET INDIAN RESERVATION, MONTANA, 1906

tops, and set their marks upon all living persons found there, creates a fear in the mind of the lone faster that can be overcome only by the greatest courage.

Like many other people the Blackfeet speak of the immaterial part of themselves as the shadow. When a man is near death, they say that his shadow is about to depart, etc. After death these shadows are supposed to make frequent visits to their old

haunts and even communicate with the living. The religious ceremonies of the Blackfeet are quite complex and are usually based upon elaborate rituals. These rituals are in turn based upon one or more myths. In some cases it seems possible to trace out the development of a ritual by successive additions from separate myths. It is interesting to note, however, that these myths still remain distinct and independent, while the rituals are justified by reference to them. Several of these rituals have been recorded by phonograph and transcriptions made, which together with the accompanying ceremonial objects and regalia give the Museum a valuable addition to its North American collections.

Another important feature of this visit was the discovery of extensive archæological remains on the site of the present Blackfeet Reservation. Up to this time next to nothing was known of the archæology of the head-waters of the Missouri and the Plains to the north, and some archæologists have ventured to assume that this region was peopled within the last five hundred years. While the mere finding of deeply imbedded remains does not prove ancient occupation, nevertheless, it marks an important advance in our knowledge of this area.

With the result of the season's work the Museum has available the information and material for a critical study of the origin of the Blackfeet tribes and the presentation of their native culture, both material and immaterial. As these people occupied the extreme northwest corner of the Plains and were in geographical proximity to the Indians of British Columbia, especially investigated by the Museum, the recording of their culture is of considerable ethnological importance.

CLARK WISSLER.

IV.—THE EXPEDITION TO THE WEST FOR BIRD GROUPS.

THE writer, accompanied by J. D. Figgins, of the Department of Preparation, and Bruce Horsfall, artist, left New York April 28, 1906, to gather material for groups of certain western birds. These groups belong in the series designed to show not only North American birds, but North America as well.

That is, each group is accompanied by a panoramic background, painted from nature, of the country in which the studies for the group were made.

It is desired in these large paintings to present so wide a variety of types of American scenery that when the undertaking is completed we shall have an adequate representation of American scenery. Such an exhibit will demand attention not only because of its beauty, but also because of its educational value. No one could examine it without receiving more or less definite impressions of the topography of this country, of the appearance of its prairies, plains and mountains, its deserts and marshes.

In selecting subjects for the season's work, therefore, the country as well as its bird-life was taken into consideration. In Nebraska it was proposed to study Prairie Hens and their home; in Wyoming, the Sage Hen of the sage plains, and the Golden Eagle in the clay bluffs; in southern Arizona, the birds of the remarkable cactus-grown deserts; in the Coast Range of southern California, the California Condor, and among the tulé lakes of southeastern Oregon, the White Pelican and other water-birds which nest there in immense numbers.

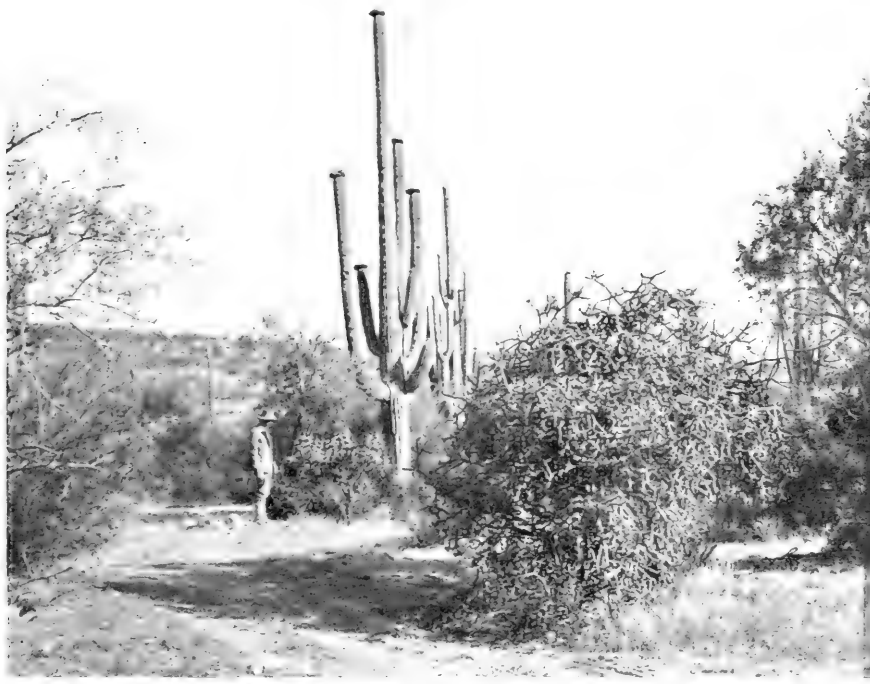
Thanks to the coöperation of local naturalists and of the various correspondents whose advice had been secured in advance the work of the expedition was performed on schedule time, material for all the contemplated groups being secured.

In Nebraska, through the assistance of Professor Lawrence Bruner of the State University and Mr. Wm. G. Mast of the Forest Service, at Halsey, we lost no time in finding a country where Prairie Hens are still abundant. The birds were indulging in the peculiar antics which mark the advent of their breeding season, and with the aid of a blind the writer succeeded in making a study of their singular evolutions at close range.

At Tucson we received much valuable advice and information from the staff of the Carnegie Desert Laboratory, and have especially to thank Dr. D. T. MacDougal, the Director of the Department of Botanical Research of the Carnegie Institution. Our camp here was most favorably situated for the prosecution of our work, which, it may be added, so far as the vegetation is concerned, is by far the most ambitious of any we have thus far

planned. However, Mr. Figgins already has the accessories for this group so far advanced that its success is assured. The scene selected for the background, showing the Santa Cruz Valley and Santa Catalina Mountains, is one of great beauty, and the group promises to be among the most noteworthy of the series.

In Wyoming, Mr. C. J. Hittell of San Francisco, whose painting for the background to the San Joaquin Valley group has been



SCENE NEAR TUSCON, ARIZONA; WHERE STUDIES WERE MADE FOR THE DESERT BIRD GRCUP

so much admired, took Mr. Horsfall's place, and, thea ccessory work now being of a comparatively simple nature, Mr. Figgins returned to the Museum. With a "prairie schooner" outfit, we penetrated the Bates' Hole region some fifty miles north of Medicine Bow, encountering snow and cold, wintry weather, strikingly unlike the torrid climate we had left in Arizona. The photograph on page 212, shows the nest and scene selected for the Golden Eagle group. The background for the Sage Hen

group will show the wide-reaching sage plains with the Snowy Range and Elk Mountain on the horizon.

In southern California we were exceptionally fortunate in securing the services of a ranchman who knew of nesting sites of the now rare and retiring California Condor. The nest-site

STUDY FOR GOLDEN EAGLE GROUP, BATES' HOLE, WYOMING

of which studies were made is high in the walls of Piru Cañon, which will appear in the background to the group.

From the rocky aërie of the Condor we went to the totally different home of the White Pelican in the great tulé lakes of Oregon. The Pelicans, with California and Ring-billed Gulls, Caspian Terns, Cormorants and Great Blue Herons, here nest

on the floating tulé islands where they are secure from the attack of predaceous mammals.

The background to this group will show some of the many bird-inhabited islets, while thirty miles away snow-crowned Mt. Shasta rising impressively, dominates the scene.

The Government has selected these lakes for reclamation by drainage. The work is already well advanced, and the birds will soon find that they have failed to secure title to their homes through proper entry at the land office. The nine points of possession will yield to the one of might, and alfalfa will grow where the Pelicans, Gulls and Terns now raise their young. The Museum is fortunate, therefore, in securing material for this group before the demands of civilization shall have forced the birds to abandon the region.

FRANK M. CHAPMAN.

V.—ENTOMOLOGICAL EXPEDITION TO THE BLACK MOUNTAINS OF NORTH CAROLINA.

THE generosity of Mr. Samuel V. Hoffman enabled the Curator of the Department of Entomology to make a visit, lasting from June 20 to October 1, to the Black Mountains in western North Carolina. This trip was in continuation of the work of previous years in the same region through funds provided by the late Very Reverend Eugene A. Hoffman.

The object of this trip was to collect species and data not before obtained. In this respect the expedition was only partly successful owing to the heavy and unusual rain and fog which prevailed throughout the season. Still a large number of exceedingly interesting species and of species new to science were collected, particularly of bees, wasps, flies, beetles, as well as representatives of other orders of insects.

Many new species of insect galls and their makers were bred and four specimens of the beautiful, metallic green long-horn beetle (*Anthophylax hoffmani*), named in honor of the late Very Reverend Eugene A. Hoffman, were taken in the dense balsam forests which cover the summit of the Black Mountains. A figure of this insect was published in the MUSEUM JOURNAL, Vol. IV, page 11. In all, at least 8,000 specimens were collected.

The insect life of the Black Mountains is the most Alpine of the southern Alleghanian fauna and, therefore, most typical of that fauna which skirted the great ice pack of the glacial epochs. The species of this fauna occupied a large part of the area of eastern North America during glacial times, during which most of them became extinct. Therefore, the species of the Appalachian system are a remnant of an at one time very extensive fauna. Their present relationships are, to a certain extent, with the modified forms of lower altitudes in their neighborhood, but, to a far greater extent, with the boreal forms found in more northern latitudes. This boreal fauna is the one from which fully one-half of the present species in this country have been derived. Consequently a proper understanding of the species from these regions gives one a better idea of the origin of all the types having northern affinities.

The Black Mountains being the loftiest of the great Appalachian System (Mt. Mitchell, with an elevation of 6,710 feet, being the highest peak,) were therefore selected as a region in which the remains of this pre-glacial life could be studied to the best advantage.

WILLIAM BEUTENMÜLLER.

THE TJÄDER EAST AFRICA EXPEDITION.

RECENT reports from the Tjäder Expedition, which left New York early in the year for an extended collecting trip in British East Africa, indicate that the party has been remarkably successful in securing fine specimens of large mammals. This expedition was made possible through the generosity of Mr. Samuel Thorne and is conducted by Mr. Richard Tjäder, who is accompanied by Mr. Herbert Lang, one of the Museum's preparators.

The party entered Africa by way of Mombasa and made its first camp in May on the banks of the Athi River. In this region Mr. Tjäder and his assistants secured specimens of zebras, hartbeests, Thompson's gazelle, antelopes and birds. From the Athi River the party marched northward, making its headquarters for three weeks at Kijabe (Jabe Hill). In the hunting

grounds near this place two fine rhinoceroses were taken, the larger measuring 11½ feet in length and 5½ feet in height.

At Maroroni River camp, north of Kijabe, an unusually large elephant was killed. It was 25 feet 9 inches in length and 11 feet 5 inches in height. Its tusks were 6 feet 4 inches long and weighed from 180 to 200 pounds.

During the latter part of July the expedition was encamped on a plateau 5,000 feet high, on the line of the equator, near Mt.

THE FIRST ZEBRAS OF THE TJÄDER EXPEDITION

Kenia. In this region game was abundant, and the skull, skin and skeleton of a fine rhinoceros, a buffalo and three kinds of antelope were secured.

The first week in August the party pushed northward through pathless forests and over a mountainous region, finally pitching camp on the south shore of Lake Harrington. From this camp Mr. Tjäder reports the killing of flamingos, crocodiles, hartbeests and oryx antelopes.

It is the plan of the expedition to push northward as far as Lake Baringo, a distance of between four and five hundred

miles from the coast; then, after swinging southeastward to Laikipia, to return by way of Mt. Kenia to Kijabe, which they expected to reach about September 12. From this point they intend to traverse the practically unknown country southwest of Kijabe toward German East Africa.

MUSEUM LECTURE SCHEDULE.

MEMBERS' COURSE.

THE first course of lectures for the season 1906–1907 to members of the American Museum of Natural History and those holding complimentary tickets given them by members will be given according to the following programme. The lectures will be delivered by members of the scientific staff of the Museum and will be fully illustrated by stereopticon:

Nov. 8. FRANK M. CHAPMAN,
A Sketch of California Bird-Life.

Nov. 15. HENRY E. CRAMPTON,
A Zoölogist's Journey to the Society Islands.

Nov. 22. LOUIS P. GRATACAP,
Iceland—Its Scenery and Inhabitants.

Dec. 6. S. ALFRED MITCHELL,
Fragments of Other Worlds: An Astronomical Lecture with special reference to the Museum's Collections of Meteorites.

Dec. 13. EDMUND OTIS HOVEY,
Subject announced later.

PEOPLE'S COURSE.

THE programme of the Free Lectures to the people which are given Tuesday and Saturday evenings in coöperation with the Department of Education of the City of New York for the first course of the season 1906–1907 is as as follows:

A Course of Eleven Lectures on European Geography.
A Course of Five Lectures on Chemistry.
A Course of Six Lectures on Physical Geography.

Tuesday, October 2d. PROF. LOUIS AUGUSTE LOISEAUX.
1. "A Walking Tour in Switzerland."
Illustrated by stereopticon views.
Saturday, October 6th. PROF. MORRIS LOEB.
(Of New York University).
1. "Introduction to the Study of the Carbohydrates."
The first of a course of five lectures on "The Chemistry of the Carbohydrates."
Illustrated by specimens and chemical experiments.
Tuesday, October 9th. DR. WILLIAM A. MURRILL.
2. "The Austrian Tyrol."
Illustrated by stereopticon views.
Saturday, October 13th. PROF. MORRIS LOEB.
2. "Classification of Carbohydrates. Their Occurrence in Nature. (a) Single Sugars."
Illustrated by specimens and chemical experiments.
Tuesday, October 16th. DR. LEWIS GASTON LEARY.
3. "The Mighty Danube."
Illustrated by stereopticon views.
Saturday, October 20th. PROF. MORRIS LOEB.
3. (b) "Double Sugars."
Illustrated by specimens and chemical experiments.
Tuesday, October 23d. PROF. HENRY E. NORTHROP.
4. "Munich and the Bavarian Alps."
Illustrated by stereopticon views.
Saturday, October 27th. PROF. MORRIS LOEB.
4. "Complex Carbohydrates.—I."
Illustrated by specimens and chemical experiments.
Tuesday, October 30th. PROF. LOUIS AUGUSTE LOISEAUX.
5. "Northern Italy."
Illustrated by stereopticon views.
Saturday, November 3d. PROF. MORRIS LOEB.
5. "Complex Carbohydrates.—II."
Illustrated by specimens and chemical experiments.
Tuesday, November 6th. COL. EDWIN A. HAVERS.
6. "The Mediterranean."
Illustrated by stereopticon views.
Saturday, November 10th. PROF. WILLIAM LIBBEY.
1. "Erosion." The first of a course of six lectures on "Physical Geography."
Illustrated by stereopticon views.

Tuesday, November 13th. MR. ARTHUR STANLEY RIGGS.
7. "Naples, Its Environs and Vesuvius."
Illustrated by stereopticon views.
Saturday, November 17th. PROF. WILLIAM LIBBEY.
2. "Rivers."
Illustrated by stereopticon views.
Tuesday, November 20th. MR. ARTHUR STANLEY RIGGS.
8. "Vistas in Sicily."
Illustrated by stereopticon views.
Saturday, November 24th. PROF. WILLIAM LIBBEY.
3. "Geysers."
Illustrated by stereopticon views.
Tuesday, November 27th. MR. FREDERICK E. PARTINGTON.
9. "Greece."
Illustrated by stereopticon views.
Saturday, December 1st. PROF. WILLIAM LIBBEY.
4. "Volcanoes."
Illustrated by stereopticon views.
Tuesday, December 4th. MR. FREDERICK E. PARTINGTON.
10. "Constantinople and the Bosphorus."
Illustrated by stereopticon views.
Saturday, December 8th. PROF. WILLIAM LIBBEY.
5. "Earthquakes."
Illustrated by stereopticon views.
Tuesday, December 11th. MR. ARTHUR STANLEY RIGGS.
11. "Egypt and the Nile."
Illustrated by stereopticon views.
Saturday, December 15th. PROF. WILLIAM LIBBEY.
6. "Glaciers."
Illustrated by stereopticon views.

A GUIDE TO THE SPONGE ALCOVE IN THE AMERICAN MUSEUM OF NATURAL HISTORY.[1]

By Roy Waldo Miner,

Assistant Curator Department of Invertebrate Zoölogy.

PONGES are among the most abundant and most widely distributed of sea-animals. With the exception of one family, the fresh-water sponges, they are found in all seas of the globe ranging from shallow waters to beyond a depth of 1,300 feet. The bath-sponges of commerce, with which the word "sponge" is associated in the minds of most people, although from a commercial point of view the most important of the group, form but a single family, *i. e.*, the Spongidæ. The rest of the subkingdom with its great multiplicity of forms is doubtless comparatively unknown to the average person. Even the commercial sponge as it reaches us gives but little idea of what a sponge really is, as it is only the supporting or skeletal part of the animal colony denuded of its fleshy coat of living tissue.

The living sponge is either a single animal or a colony of animals. It is always sessile, that is, attached to the sea bottom, and incapable of locomotion. For this reason it has often been regarded as a plant. But since, in more recent years, its life processes and larval history have become better known, especially since it has come under the eye of the compound microscope, its animal nature has become clearly established.

Sponges show all variations of form, size, and color. There are cake-like sponges, dome-shaped sponges, and fan-shaped sponges. Some are branched like trees; in others the branches reunite to form a complicated network. Some are shaped like huge cups or goblets; some gather in clusters of trumpet- and

[1] Issued also in separate form as Guide Leaflet No 23.

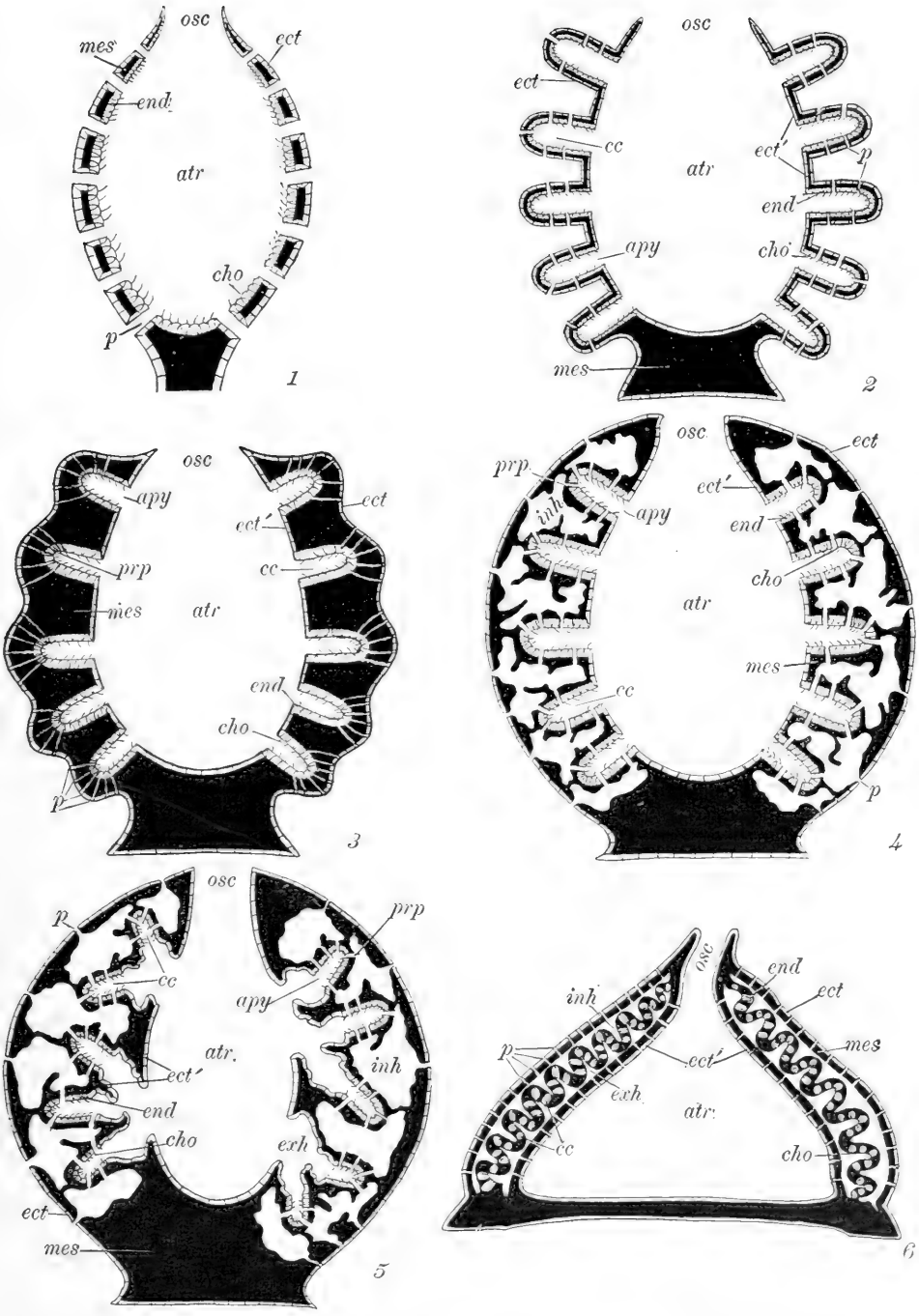
tube-like forms, and even the simplest and most primitive sponges are often shaped like graceful vases. All these forms are found in sizes varying from that of a pinhead to the height of a man.

Their color is as varied as their shape and size. They run through the whole chromatic scale from brilliant red, yellow, and green to the most delicate blue and the deepest violet, in every gradation of shade and tint. Some are pure white, others are shining black, while still others reflect from their opal spicules all the colors of the rainbow.

As the form and color of sponges, however, may vary as much among members of the same species as among those of different species these factors cannot be depended on for classification. The same sponge which in deep water shows the branching habit, in shallower water appears as a flat encrusting colony; or a sponge which has a symmetrical vase-like form, many feet below the surface of the sea, where it is little disturbed by outer influences, may be of the same species as an irregular one-sided mass growing in shallow water or in the crevice of a rock. Again a sponge usually dome-shaped may send out a finger-like process from its upper surface which becomes branched and unites with the branches of other finger-like processes. In other words external form in sponges is not a constant or essential factor. It is purely a matter of environment, in which gravity plays an important part. This tendency to vary has made the arrangement of sponges in an orderly and natural system, a difficult task, much complicated by the fact that for many years classification has been wrongly based upon these very factors. Since, however, the microscope has been developed to its present perfection, it has been found that the arrangement of the skeleton and the form of the spicules or skeletal units, together with the structure of the canal system, furnish more constant data for classification. This can be brought out more clearly in discussing the anatomy of the sponge.

ANATOMY.

In considering the anatomy of sponges it is sufficient for our purpose to concern ourselves with:



FIGS. 1—6.—DIAGRAMS ILLUSTRATING CANAL SYSTEMS IN DIFFERENT TYPES OF SPONGES (after Schulze).

1 Ascon type ; 2–5. Variations of Sycon type ; 6. Rhagon type ; *ect.*, ectoderm of exterior; *ect'*, ectoderm of atrial cavity ; *mes.*, mesoderm ; *end.*, endoderm ; *osc.*, osculum; *atr.*, atrial cavity or cloaca ; *cho.*, choanocyte layer ; *cc.*, flagellate chambers ; *p.*, pores ; *prp.*, prosopyles ; *apy.*, apopyles ; *inh.*, inhalent cavities; *exh.*, exhalent cavities.

1. General Structure,
2. The Canal Systems,
3. The Skeleton.

1. *General Structure.*

This is best shown by the description of a simple sponge in which the general characteristics of the subkingdom predominate, unmodified by special conditions.

FIG. 7.—AN EXAMPLE OF THE BRANCHING HABIT

The simplest, most primitive, and at the same time most typical sponge is *Ascetta primordialis*, first described by Häckel

(See Fig. 1.). This sponge is typically vase-like in external form. The circular opening at the top of the vase is known as the *osculum* (*osc.*) in spite of the fact that it is excretory and has neither structurally nor functionally the characteristics of a mouth.

The walls of the vase are perforated with numerous regularly arranged openings or pores (*p.*) which open directly into the hollow interior of the sponge—called the *paragastric* or *atrial cavity* (*atr.*). The walls are made up of three layers: 1st, the ectoderm, or outer layer; 2d, the endoderm, or inner layer; 3d, the mesoderm, or middle layer.

The *ectoderm* (*ect.*) is a thin layer of cells, generally arranged in mosaic form and known as "pavement cells." In the case of this species, however, the walls of the cells have disappeared and left the protoplasmic cell-contents continuous over the entire surface of the animal. Such a layer is called a *syncytium.*

The *endoderm* (*end.*) lines the paragastric cavity and is made up of a layer of peculiar and characteristic cells called "collared cells," or *choanocytes* (*cho.*), found nowhere else among many-celled animals. They are so called from a collar-like rim around the outer edge of the cell out of which extends a long whip-like

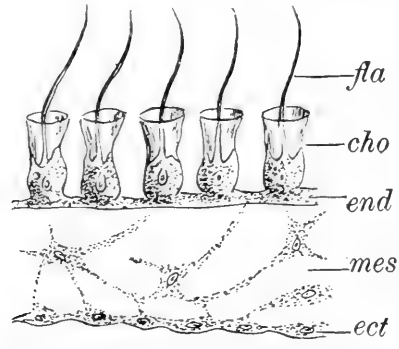


FIG. 8.—SECTION THROUGH SPONGE WALL

ect., ectoderm ; *mes.*, mesoderm ; *end.*, endoderm ; *cho.*, choanocytes or "collared cells"; *fla.*, flagellum.

filament or *flagellum* (*fla.*). The continuous vibration of these flagella produces a current by means of which the sea-water, with its multitude of tiny animal and plant forms, is sucked in through the pores. The organisms are then seized upon by the

choanocytes and their digestible parts absorbed. What is left is discarded and flows with the current out through the osculum at the summit of the vase.

The *mesoderm* (*mes.*) is a thin jelly-like layer between the ectoderm and endoderm. It contains scattered amœboid cells and the reproductive elements, and is the origin of the skeleton.

2. *The Canal Systems.*

In the form of sponge just described the mesoderm is extremely thin, but if, as in the majority of sponges, there is a greater or less thickening of this layer, the pores will no longer be perforations, but will become transformed into tubes or canals

FIG. 9.—A SYCON SPONGE (*Grantia ciliata* Fleming) GROWING ON A MUSSEL SHELL
Star-shaped colonies of the Ascidian *Botryllus* are also growing on the same shell.

(See p. 221, Fig. 3), which may branch and be modified in various ways. This gives rise to three general types of sponges which are therefore based mainly on the arrangement and variations of the pore- and canal-systems. These are known as

(a) The Ascon Type,
(b) The Sycon Type,
(c) The Rhagon Type.

(a) *The Ascon Type* (p. 221, Fig 1.). This type is characterized by sponges having walls with a thin layer of mesodermal tissue (*mes.*), and therefore, with pores (*p.*) opening directly from the outside into the paragastric cavity (*atr.*). The endoderm (*end.*) is always continuously lined with choanocytes or "collared cells" (*cho.*). *Ascetta primordialis*, therefore, is the representative of this group. Another example is *Leucosolenia*, of which a specimen may be seen in this alcove. A complication of this type is shown by *Homoderma*, which differs from *Ascetta* in having its surface broken up by a multitude of radially arranged thimble-like prolongations or diverticula, each with a central cavity of its own, opening into the main paragastric cavity of the sponge and lined with a continuation of the endoderm with its collared cells. In this case the pores are found only in the walls of the diverticula.

(b) *The Sycon Type* (p. 221, Figs. 2–5; p. 224, Fig. 9). In this type, as in the example just described (*Homoderma*), the walls of the paragastric cavity are prolonged into radially arranged branches called *radial tubes* (*cc.*) but the choanocytes, instead of lining both the paragastric cavity and the radial tubes, are found only in the latter, while the former is invested with a layer of epidermal "pavement cells" (*ect.*) like the outside of the sponge. The mouth of the radial tube by which it opens into the central cavity is called the *apopyle* (*apy.*). In the simpler sponges of the Sycon type, such as *Sycon ciliatum*, the pores open directly into the radial tubes (Fig. 2) and the outer surface of the sponge is covered with papillæ corresponding to the cavities within. In these forms, the mesoderm (*mes.*) continues to be thin. In other forms, however, the mesoderm becomes greatly thickened and completely fills the spaces between the radial tubes (Fig. 3) so that the outer surface appears comparatively smooth and free from papillæ. Under these circumstances the pores cannot open directly from the outside into the radial tubes, so they lengthen into *inhalent canals* traversing the mesoderm. In still other forms (Fig. 4) the canals have enlarged to wide cavities or *inhalent lacunæ* (*inh.*) opening to the outside by the pores and into the radial tubes by openings called *prosopyles* (*prp.*). Another complication occurs in the Leucons where the walls of the para-

gastric cavity become folded in such a manner that the radial tubes lose their radial position and open into the folds or their branches (Fig. 5, *cc.*). The openings by which the folds communicate with the paragastric cavity may then become narrowed and thus large irregular spaces called *exhalent lacunæ* (*exh.*) are formed, with the result that the radial tubes become mere tubular chambers (*cc.*) communicating at the open end with the paragastric cavity (*atr.*) only by the intervention of the inhalent lacunæ (*inh.*), which in turn communicate with the outside by the pores. As both the inhalent and exhalent lacunæ are lined

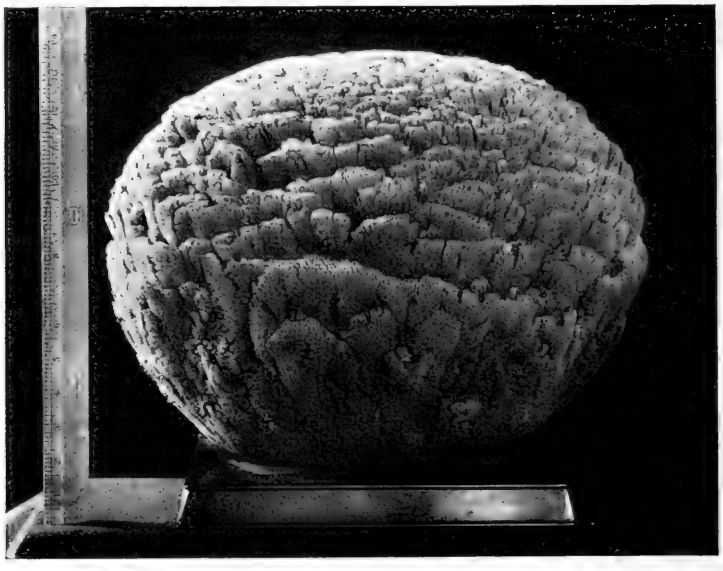


FIG. 10.—A LARGE BAHAMAN SPONGE (*Hippospongia cerebriformis* D. & M.)

with "pavement cells" (*ect.*) the choanocytes become restricted to the tubular *flagellate chambers*, as the radial tubes are now called.

(c) *The Rhagon Type* (p. 221, Fig, 6). The two preceding types of canal arrangement are peculiar to the sponges having a calcareous or carbonate of lime skeleton. The great majority of sponges, including those having "glass" skeletons, horny skeletons or no skeletons at all, belong to the Rhagon type. In this case the flagellate chambers (*cc.*) are very small and numerous and, instead of being tubular, are spherical. The mesoderm varies

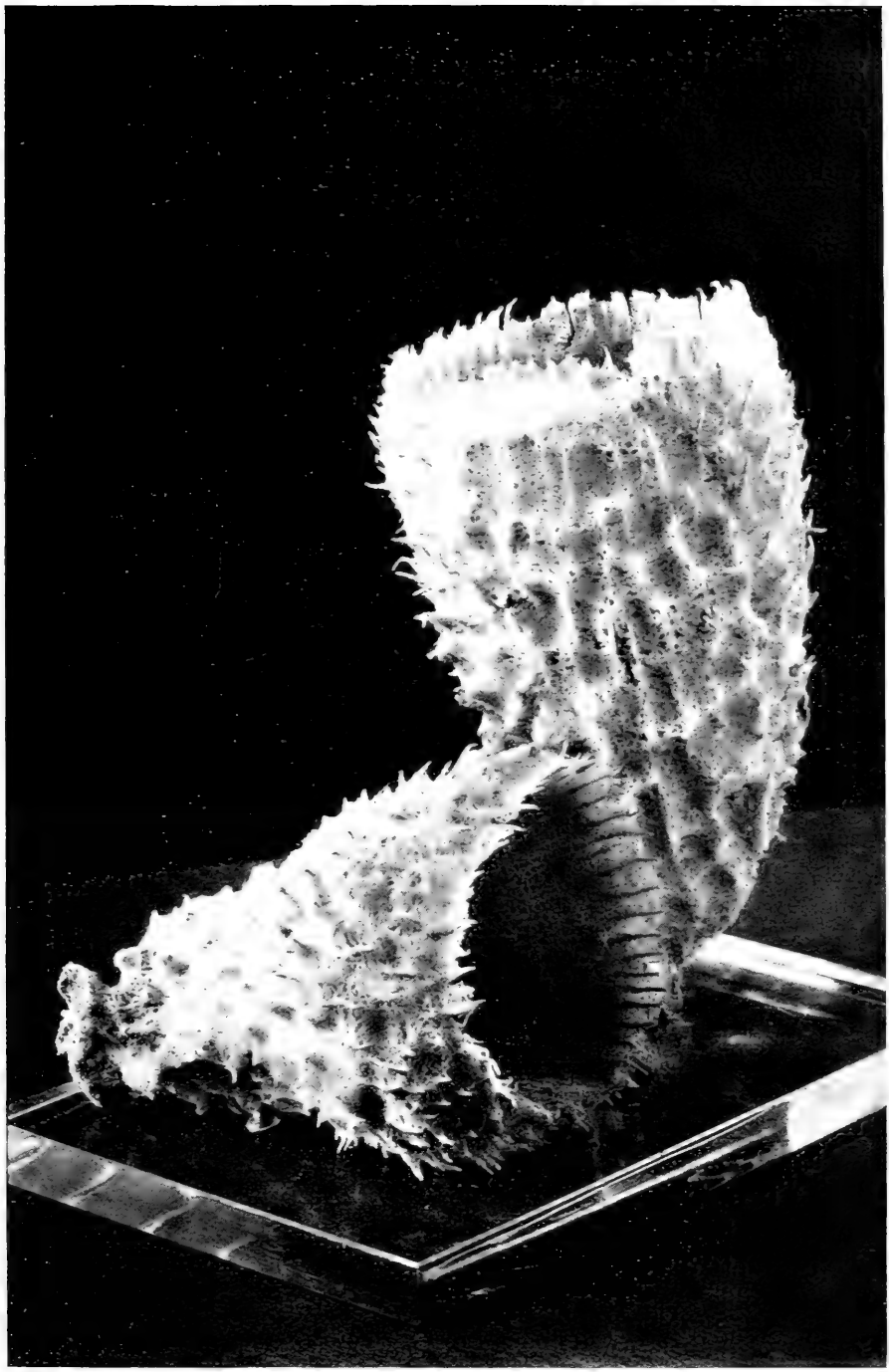


FIG. 11.—NON-COMMERCIAL HORNY SPONGES (*Stelospongia* sp.
A trumpet-like form showing plainly the *principal fibers* projecting around the rim, and the *oscula* or excurrent openings lining the cavity of the specimen.

greatly in thickness, and the canal system may become much complicated through the folding of the walls of the paragastric cavity and the development of wide mesodermal cavities (*inh.* and *exh.*).

3. *The Skeleton.*

One of the most remarkable features of sponge structure is the skeleton. It is by far the most reliable basis for classifying the sponges yet discovered, inasmuch as it is comparatively unaffected by the external surroundings of the individual and

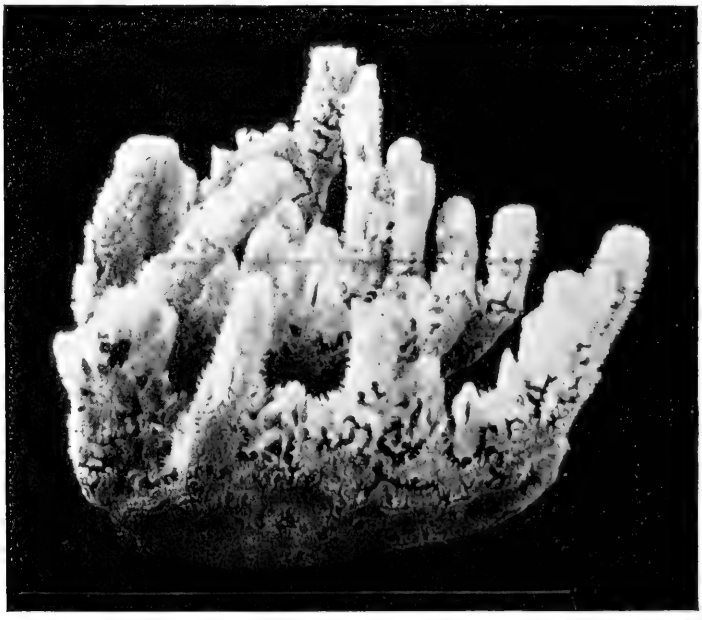


FIG. 12.—A BAHAMAN COMMERCIAL SPONGE (*Hippospongia sp.* Hyatt)
Showing colony of tube-like individuals

therefore its peculiar features remain constant to the groups of which they are characteristic. It may be composed either of fibers or spicules, and it is secreted by the mesoderm. Its function is to furnish a rigid supporting framework for the body and to act as a protection against the enemies of the sponge.

The fibrous sponges include among others those known to commerce. The skeleton is, in most cases, made up of interlacing and anastomosing fibers of a horny substance called *spongin*,

closely akin to silk in chemical composition. It is secreted by the mesoderm and is arranged so as to be a supporting basis to the layers of cellular tissue composing the soft parts of the animal. The fibers are of two kinds,—first, a set of long stout *principal fibers* (see Fig. 11), from $\frac{1}{2}$ to $\frac{1}{1}$ mm. in diameter, radiating from the base of the sponge to its surface, and secondly, a complicated network of fine *connective fibers* interlacing between the principal fibers and supported by them. The connective fibers are extremely delicate, having a diameter of only .01 to .02 mm. and with meshes scarcely as large as their diameter. Grains of sand are often found imbedded in the principal fibers, in some cases forming a considerable part of the skeleton, in others the entire substance. The spongin fiber is made up of a soft central core

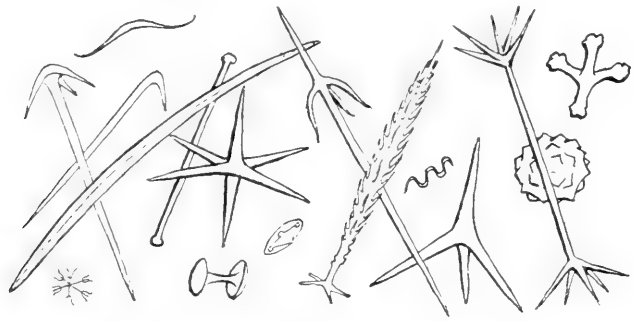


FIG. 13—SOME TYPICAL FORMS OF SPONGE SPICULES

or *medullary axis*, surrounded with successive layers of the spongin substance. The classification of the horny sponges is based upon the minute characters of the network. A few sponges of small size have no skeleton at all, being supported by whatever rigidity their tissues may possess, but with these exceptions all except the horny sponges have skeletons made up of *spicules* instead of fibers. These are small needle-like bodies composed of either carbonate of lime or silicon. The latter is found combined with water in such proportions as to form a substance chemically resembling opal, and of transparent glassy appearance. Hence spicular sponges may be classified as calcareous or silicious according to the nature of their skeletons. Spicules may have one or two axes, or their axes may radiate in 3, 4, 5, 6, or even 8 different directions, and are found in a great variety of forms,

some of which are shown in Fig. 13. Those having one or two axes may be straight, curved, or bent at various angles. They may be pointed, rounded or knobbed at one or both ends. They may be smooth or spined. Spicules having a greater number of axes may also have their arms pointed, rounded or knobbed, or each arm may be branched, either once or twice, or to such a degree as to present a great variety of star-like figures. Spicules occasionally assume extremely odd shapes. Some look like tiny cuff-buttons, others like anchors, horseshoes and hooks of peculiar design, while still others are coiled like springs. As regards size they may be divided into two classes:

FIG. 14.—A DICTYONID SPONGE (*Farrea occa* Carter)
With rigid lattice-like skeleton.

megascleres, or large spicules, and *microscleres*, or small spicules. The megascleres form the main supporting structure of the skeleton and are bound together in long fiber-like bundles which are either parallel, or cross each other so as to form triangular or square meshes. They are sometimes entangled and interlaced in all directions like felt, clinging to each other with their hooks and projections. In the Dictyonid sponges (Fig. 14) the megascleres are of three axes at right angles to each other and are arranged with points overlapping. During the life of the sponge these

grow together and finally form a perfectly rigid network. The microscleres on the other hand are not supporting in function. In fact in most cases their use is unknown. They are found embedded in the fleshy parts of the sponge and are so minute as to be distinctly visible only under a high power of the microscope. They are extremely valuable in determining species.

REPRODUCTION AND DEVELOPMENT.

Sponges may reproduce either by budding (*asexual reproduction*), or by means of eggs (*sexual reproduction*). Reproduction by budding is brought about by an outgrowth of cells from the side of the sponge involving all three layers. This finally develops

FIG. 15.—FRESH WATER SPONGES (*Spongilla* sp.)

into a miniature of the parent sponge, as far as structure is concerned, becomes narrowed at the base until it is only attached by a stem, and finally drops off. It then becomes fixed to the sea-bottom and grows to maturity. Sexual reproduction on the other hand is only effected by the union of sexual elements within the tissues of the parent sponge. The male and female reproductive cells originate in the mesoderm of the same individual and unite to form the fertilized unicellular egg. The larva is developed from the one-celled stage, by a process of cell division or cleavage. It passes through 2-, 4-, and 8-celled

stages by vertical divisions, at the end of which time it appears as a circular disc divided into eight equal segments. These again divide into a 32-celled stage by means of a horizontal or *equatorial* cleavage, and then, by repeated divisions of the eight upper cells, a hollow sphere is formed composed of eight large granular cells and many small cells, each of the latter bearing a long flagellum or whip-like filament. The eight large cells divide more slowly, always remaining comparatively large, and are not provided with flagella.

At this so-called *blastula* stage the larva issues from the

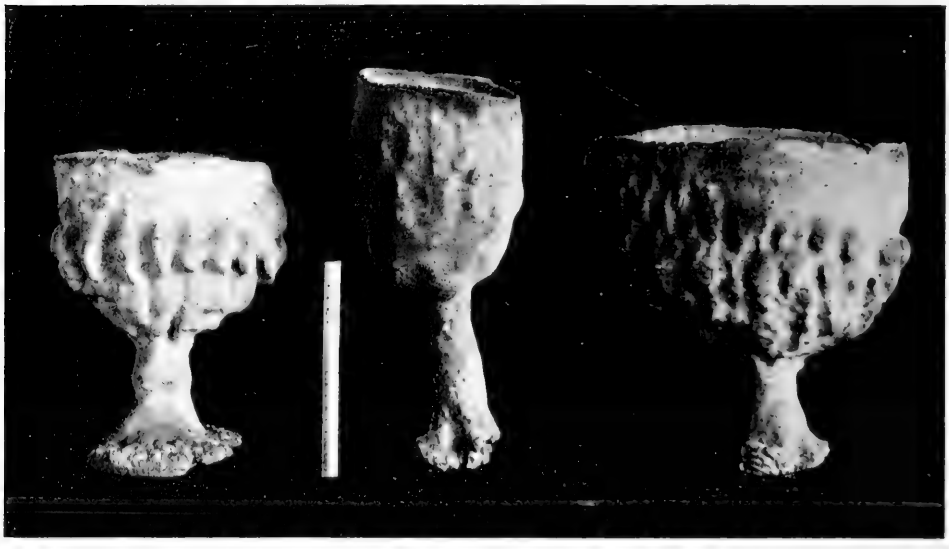


FIG. 16.—A GROUP OF NEPTUNE'S GOBLET SPONGES (*Poterion neptunei* Harting.)
The tallest specimen is 33 inches high.

endoderm of the parent and finally passes out through the osculum of the sponge. It swims rapidly about with its flagellate portion in front, and after a time the large granular cells grow around and enclose the flagellate cells. Soon a sup-chaped body is formed, known as the *gastrula*, which is covered with non-flagellate cells, and lined with a multitude of flagellate cells. The opening of the cup, or *blastopore*, now narrows and almost immediately the larva settles down and becomes fixed by the rim of the blastopore to a rock or some other object. The development is now very

rapid. The blastopore closes; the flagellate cells develop collars and become choanocytes; the osculum or excretory opening perforates the free end; the side walls are pierced with pores; traces of the skeletal spicules begin to show in scattered mesodermal cells as tiny needles of glass or carbonate of lime; and the body assumes a somewhat cylindrical shape. From now on the animal possesses all the elements of a true sponge, and growth proceeds according to its nature and environment.

PHYSIOLOGY.

This subject, in its application to sponges, is very imperfectly known.

The following facts, however, can be definitely stated:

The adult sponge is attached and is incapable of locomotion. Its only outward movements seem to be a slow dilatation and contraction of the pores and the osculum.

The choanocytes, however, are very active. The flagella are in constant vibration, and the collars are continually expanding and contracting. These cells are the chief organs of nutrition and respiration. The motion of the flagellum creates a whirlpool, by means of which the sea-water and the organisms it contains are sucked down within the collar. The cell then seizes upon, and absorbs the digestible organisms, while the constantly renewed sea-water, being brought into closer relation with the absorbing tissues, causes the necessary oxygenation to take place.

Excretory products are, without doubt, cast out by these cells and together with the indigestible organisms are borne out through the osculum by the main current of sea-water.

It is also said that during the winter many choanocytes disappear, to be restored in the spring-time. Thus a kind of hibernation seems to occur.

The growth of sponges is slow, five or six years being necessary to bring them to their full size. This, however, is very variable.

There is no muscular or nervous system. Instead, there is what has been called a "vague general sensibility" of the whole

sponge. This shows itself particularly in the movements of the osculum and pores.

Sponges may grow together if placed in contact, or, on the other hand, fragments cut from a sponge can be made to live and grow separately. This peculiarity is utilized in connection with the artificial propagation of the commercial sponges. Sponges do not, however, regenerate parts which have been cut off, although the original sponge may go on growing as if nothing had happened.

POSITION OF SPONGES IN THE ANIMAL KINGDOM.

The relation of sponges to other animal forms has always been very uncertain. The choanocytes of the endoderm seem to connect them with a group of colonial Protozoa known as *Choanoflagellates*. These are the only other animal forms which have "collared cells." In fact certain colonies of Choanoflagellates (*Proterospongia*) very much resemble primitive sponges. On the other hand sponges have often been grouped with the Cœlenterates, on account of the resemblance of the planula and gastrula larval stages to those of the Jellyfishes; because of the fixed condition of the adult, the simple structure and the sac-like internal cavity; as well as the supposed resemblance of the osculum to the Cœlenterate mouth. The latter resemblance is only apparent, however, as the osculum does not function as a mouth, nor does it have the same embryological history. Sponges, moreover, differ widely from Cœlenterates in their lack of tentacles and "sting-cells," or *nematocysts*, and are peculiar in having pores, "collared cells," and spicular skeletons. These differences are so important that it has been necessary to recognize the sponges as a separate subkingdom, most probably having a common ancestry in some group immediately derived from the Protozoa.

CLASSIFICATION.

On account of the difficulties besetting sponge classification many very widely differing schemes have been proposed. The earliest were based largely on external forms and the chemical

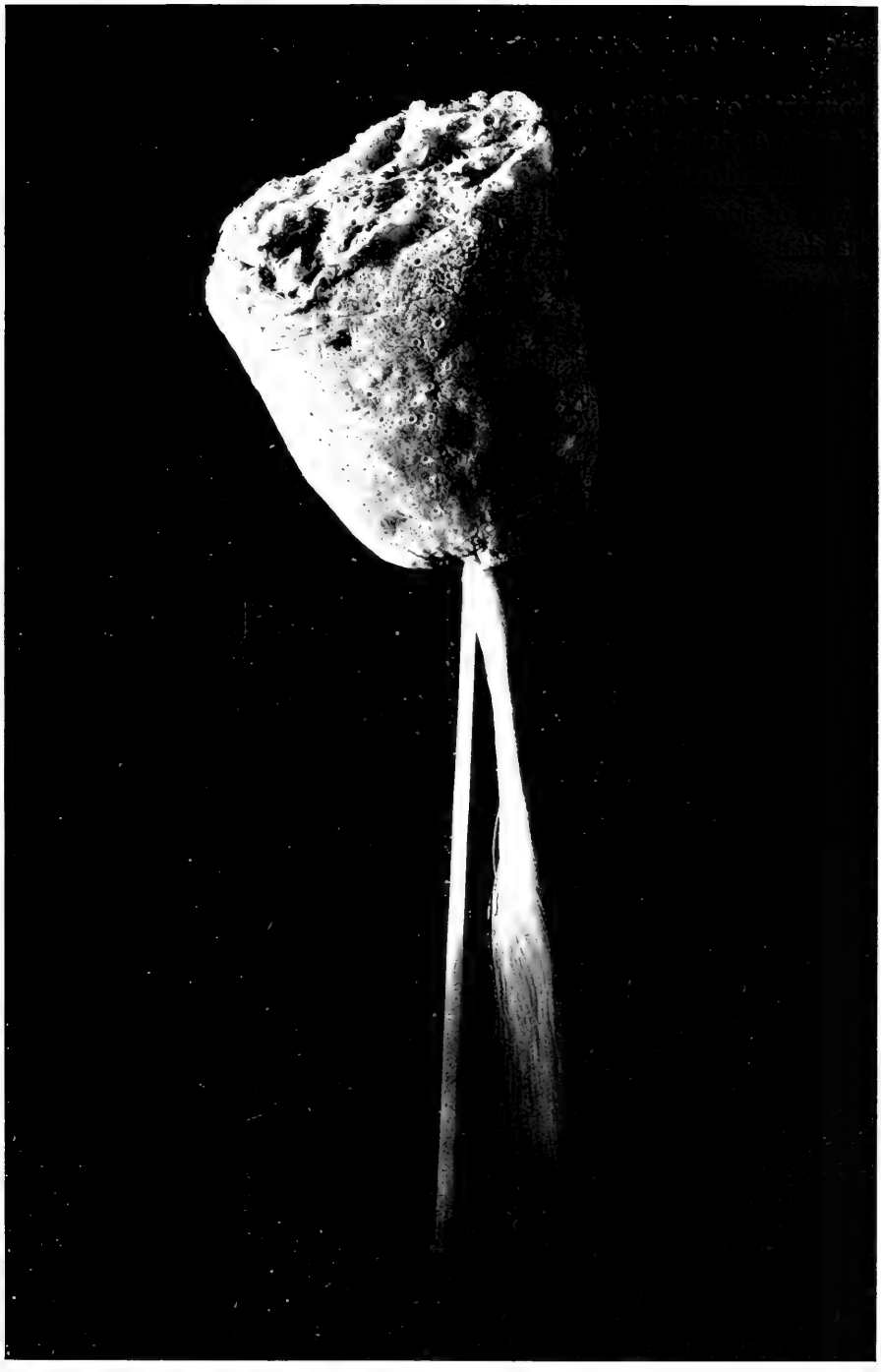


FIG. 17.—A GLASS ROPE SPONGE (*Hyalonema sieboldii* Gray)

The twisted rope-like bundle of opal spicules projecting from the base of the sponge, forms a supporting structure in life, the lower end being embedded in the mud.

composition of the sponge skeleton. The latter basis is still used for the division into classes, but the former has been for the most part abandoned on account of the plastic nature of the framework of sponges and the consequent variability of their growth-habits. Such internal features as the form and arrangement of the spicules, the extent of the choanocytic layers, and the general plan of the canal system, seem to be more constant characters, and are utilized in all recent classifications. There is, however, much variability among internal characters also, and there are yet many perplexing problems to the spongologist, especially on account of the great number of intermediate forms and unexpected relationships. In fact a genealogical diagram of the sponges would not so much resemble a branching tree, as a network with connecting fibers anastomosing in all directions, and most probably approximating in its appearance the bewildering skeletal labyrinth of the fibrous sponge itself. The following synoptic table, modified from Delage and Herouard, seems to be for the most part in harmony with recent researches, and as likely as any to have some degree of permanence, as it is largely based on internal structure, *i. e.* the skeleton and canal systems:

PORIFERA.

No nematocysts, no mouth, but with inhalent pores; a cloacal atrial cavity with a simple or multiple osculum; a mesoderm.

A. Class CALCAREA. Spicules calcareous; choanocytes large.

a. Order **HOMOCŒLIDA**. Atrial cavity lined with choanocytes. (*Leucosolenia*,* *Ascetta*, *Ascyssa*, *Homoderma*.)

b. Order **HETEROCŒLIDA.** Atrial cavity lined with pinacocytes (pavement cells), the choanocytes being withdrawn into radial diverticula or ciliated chambers. (*Sycon*, *Grantia*,* *Ute*, *Barroisia*, *Leucilla*, *Leucandra*, *Eilhardia*, *Eudea*, *Petrostoma*.)

B. Class NON-CALCAREA. Skeleton of silicious spicules, or of spongin fibers or no skeleton. Choanocytes small.

1. Subclass TRIAXONIÆ. Ciliated chambers large, elongated; skeleton of triaxial spicules or none.

a. Order **HEXACTINELLIDA.** Skeleton formed of spicules.

(1) Suborder LISSACINA. Spicules independent during growth. (*Euplectella*,* *Askonema*, *Rosella*, *Lophocalyx*, *Hyalonema*,* *Semperella*.*)

(2) Suborder DICTYONINA. Spicules united during growth to form a rigid trellis-work. (*Farrea*,* *Aphrocallistes*,* *Hexactinella*,* *Dactylocalyx*, *Ventriculites*, *Cœloptychium*.)

* Represented in Museum Collection.

b. Order **HEXACERATIDA.** Skeleton formed of fibers, or no skeleton. (*Darwinella, Aplysilla, Halisarca.*)

2. Subclass DEMOSPONGIÆ. Ciliated chambers small; skeleton formed of spicules of one or four axes; or no skeleton.

a. Order **TETRACTINELLIDA.** Skeleton formed of tetraxial megascleres, rarely reduced to microscleres, or no skeleton at all.

(1) Suborder CHORISTINA. Skeleton flexible, without interlocking desmas.

(i) Family **Sigmatophoridæ.** Megascleres present. Microscleres in the form of sigmaspires, or none. (*Tetilla, Cinachyra.*)

(ii) Family **Astrophoridæ.** Megascleres present. Microscleres in the form of asters. (*Thenea, Stelletta, Disyringa, Geodia, Pachymatisma.*)

(iii) Family **Microsclerophoridæ.** No microscleres. (*Plakina, Oscarella, Chondrosa.*)

(2) Suborder LITHISTINA. Skeleton rigid, formed of interlocking desmas.

(i) Family **Triænidæ.** Ectosome containing triænes. (*Theonella, Desmanthus, Siphonia, Corallistes, Pleroma.*)

(ii) Family **Rhabdosidæ.** Ectosome containing microstrongyles, free or in desmas. (*Neopelta.*)

(iii) Family **Anoplidæ.** Ectosome without spicules. (*Azoriea, Vetulina.*)

b. Order **MONAXONIDA.** Skeleton formed of megascleres of only one axis.

(1) Suborder HADROMERINA. Ordinarily with a cortex; megascleres in radial bundles; microscleres in asters or absent, never in the form of spires or sigmas.

(i) Family **Aciculidæ.** Diactinous megascleres. (*Tethya, Hemiasterella, Stylocordyla.*)

(ii) Family **Clavulidæ.** Monactinous megascleres. (*Spirastrella, Suberites,* Polymastia, Cliona.*)

(2) Suborder HALICHONDRINA. Ordinarily no cortex; megascleres entirely oxeas arranged in a network. (*Spongilla*, Chalina*, Reniera, Halichondria, Tedania, Esperella, Cladorhiza, Myxilla, Clathria, Axinella.**)

c. Order **MONOCERATIDA.** Skeleton formed of spongin fibers with or without microscleres. (*Euspongia,* Hippospongia,* Aplysina,* Druinella, Stelospongia,* Hircinia,* Spongelia,* Phoriospongia.**)

* Represented in Museum Collection.

TYPICAL SPONGES IN THE MUSEUM.

A. CALCAREOUS SPONGES (CLASS CALCAREA)

The most conspicuous characteristic of this class is the calcareous or carbonate of lime skeleton. The class is divided into two groups, the first containing those sponges whose hollow interior (paragastric cavity) is entirely lined with "collared cells" (order Homocœlida), the second comprising those in which the "collared cells" are confined to thimble-like prolongations of the paragastric cavity (order Heterocœlida).

An example of the **Homocœlida** is the Ascon sponge *Leucosolenia primordialis* Häckel. The genus to which this species belongs is found in all seas to a depth of 6000 feet. Its manner of growth varies from solitary, erect, cylindrical sponges to encrusting colonies of serpent-like tubes ramifying in a complicated network. Sometimes the whole colony assumes an erect vase-like form with walls made up of entwining tube-like individuals. The sponge on exhibition is of the encrusting type, growing in this instance on a colony of barnacles.

The Sycon sponge, *Grantia ciliata* Fleming, represents in the exhibition the order **Heterocœlida**. This is a common species found all along the New England sea-coast. It is a small tubular sac with the osculum surrounded by a circle of finger-like spicules, as shown in the illustration on page 224. It grows from an inch to an inch and a half in length, in small cluster-like colonies attached to sea-weed, submerged timbers, shells, etc. The specimens in the glass jar are growing on a mussel shell which is also partly encrusted with small star-shaped colonies of the interesting Ascidian, *Botryllus*.

B. THE NON-CALCAREOUS SPONGES (CLASS NON-CALCAREA).

The sponges of this class have no traces of carbonate of lime in their skeletons. Instead some contain silicious spicules

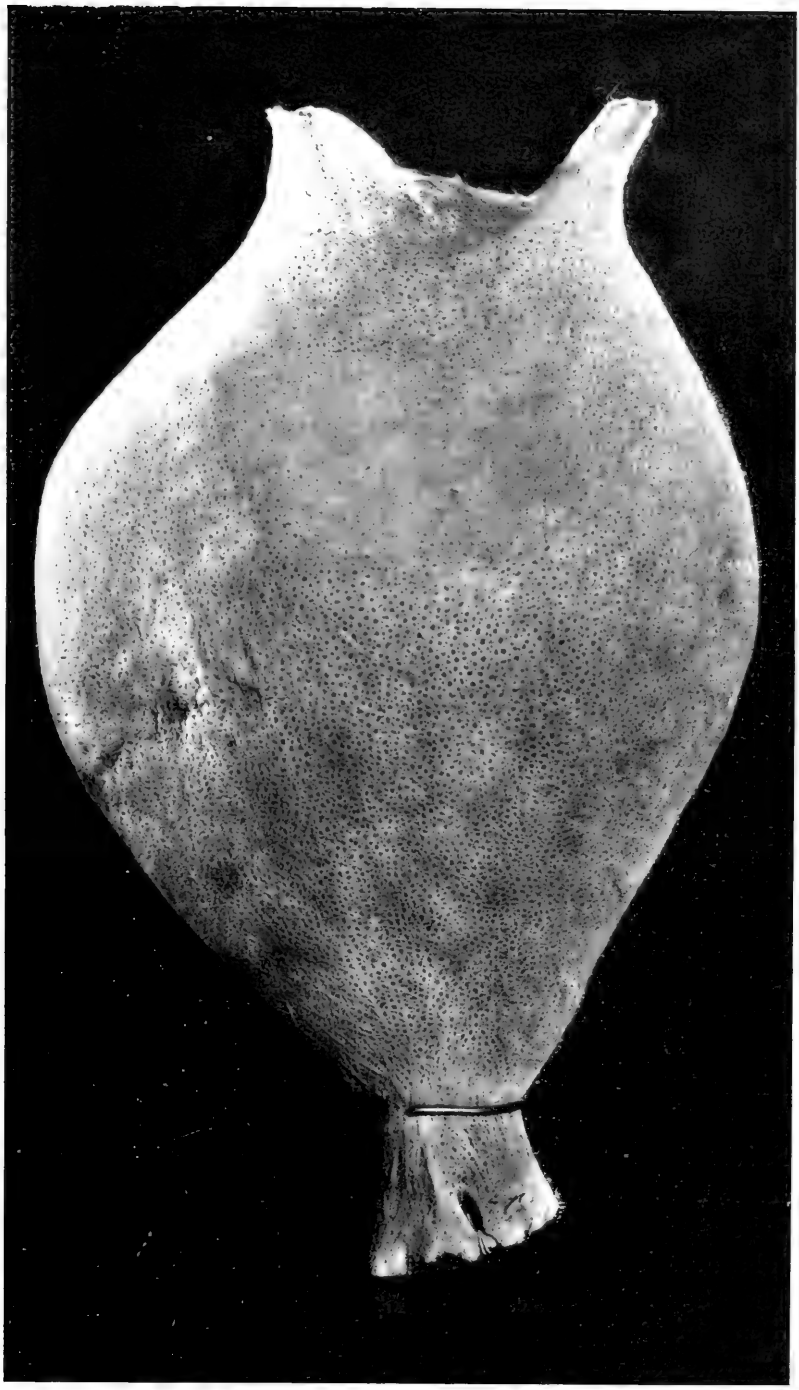


FIG. 18.—A RARE "GLASS" SPONGE (*Hyalascus similis* Ijima)
This graceful specimen illustrates the vase-like growth of many sponge colonies (Height, 15 inches.)

(the so-called "glass" sponges), or their skeletons may be partly or entirely made up of a network of spongin fibers. A few sponges have no skeletons at all.

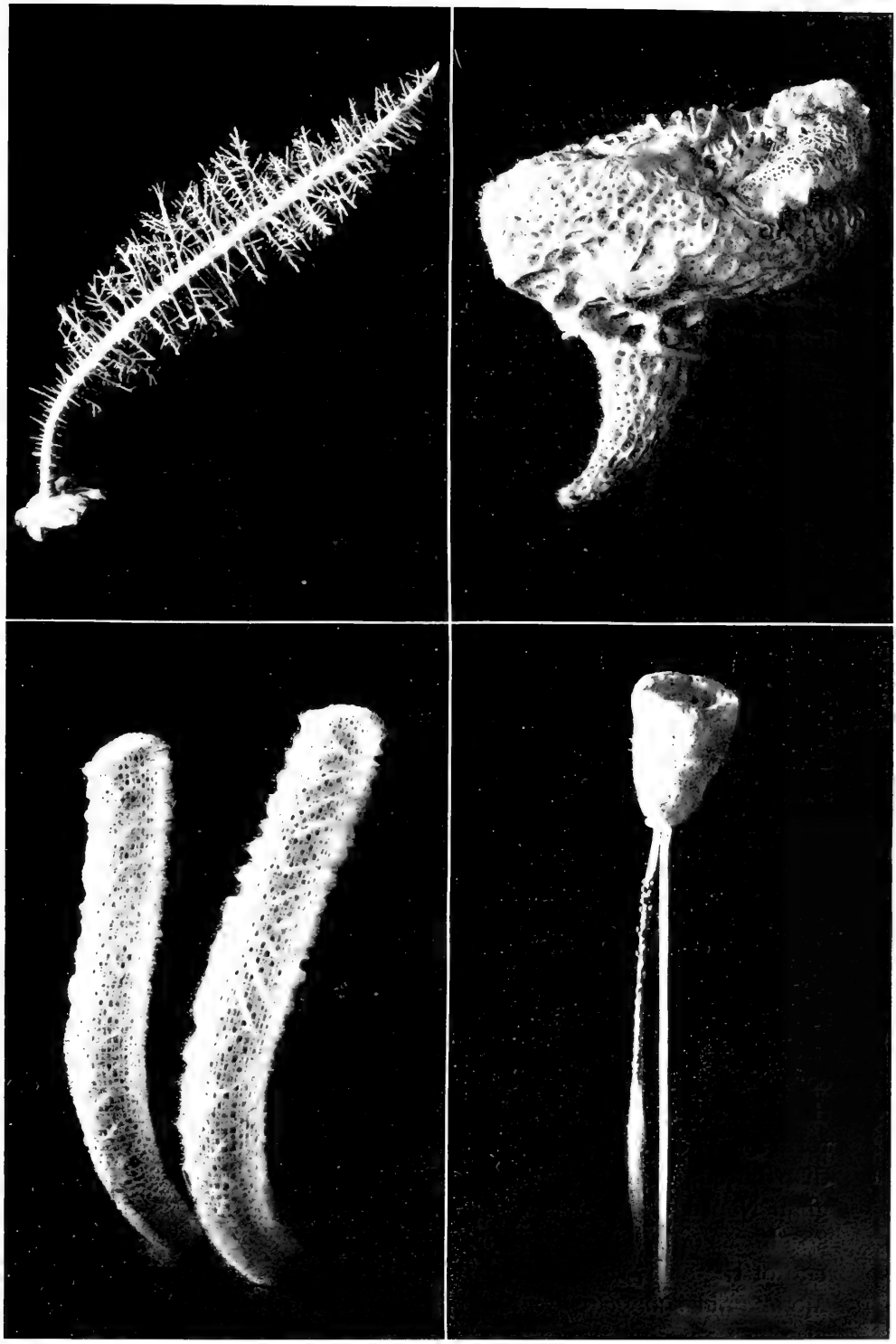
Those sponges which have six-rayed spicules belong to the order **Hexactinellida,** a group marked by forms of unusual beauty and grace, of which a fine collection is shown in this alcove. In some of these (suborder Lissacina), the spicules are independent during growth and are felted together by means of their hooks and spines; in others (suborder Dictyonina), the overlapping ends of the spicules have grown together to form a rigid lattice-like framework.

Suborder Lissacina.—The several species of *Euplectella* (Venus's Flower-basket) are especially noticeable for delicate beauty, while *Walteria* is remarkable for its odd tree-like form. *Acanthascus*, *Rhabdocalyptus* and *Crateromorpha* are also represented by fine specimens, (see opposite page) and give a good idea of the variety of forms which these sponges may assume, while the remarkable vase-like *Hyalascus similis* Ijima (Fig. 18, p. 239) is not only the type of its species, but is the only specimen known to have been found.

The so-called "glass-rope" sponges (*Hyalonema*) are remarkable for the twisted, cylindrical bundle of elongated spicules projecting from the lower end. In life this stalk-like support is anchored in the mud at the sea-bottom by means of barbs and hooks at the lower end of the spicules. An interesting peculiarity of this sponge is its association with tiny Zoöphytes (*Palythoa*) which are always found growing upon its stem (see Fig. 22). This is an illustration of the phenomenon of *symbiosis*, indicating an association of two animal forms for their mutual advantage.

Suborder Dictyonina.—The two specimens of *Farrea occa* Carter (see Fig. 14, p. 230) and *Aphrocallistes* show particularly well the lattice-like framework peculiar to this group, and also the characteristic manner of growth of these sponges.

The glass sponges are all universally distributed in the deep waters of tropical seas. Most of the specimens exhibited in this Museum were collected in the Sagami Sea, an arm of the Sea of Japan. This is a particularly favorable locality, as the sea-bottom falls away rapidly to a great depth close to the shore,



FIGS. 19-22.—SOME TYPICAL "GLASS" SPONGES

FIG. 19.—A tree-like species (*Walteria leuckhardti* Ijima).

FIG. 20.—The Cactus Sponge *Acanthascus cactus* Schulze).

FIG. 21.—Venus's Flower-basket (*Euplectella speciosissima* Owen).

FIG. 22.—A "Glass-rope" Sponge (*Hyalonema ozeroni* Ijima) with *Palythoa* growing on stem.

thus giving an opportunity for deep sea forms to stray up into comparatively shallow water.

The native method of collecting these sponges is interesting. An apparatus called a "dabo line" is used. This is a long line about an eighth of an inch in thickness, to which smaller branch lines or "snoods" are attached at short intervals. Each "snood" ends in a brass or iron wire hook with a barbed point. The "dabo lines" are coiled in baskets placed in the bottom of a boat manned by five or six men. The hooks are stuck in a row around the edge of the basket, and as the line is uncoiled, are successively unfastened by one of the men. The line is set by tying one end to the end of a long rope weighted with a stone sinker. The latter is then lowered perpendicularly, carrying the "dabo-line" with it, until the required depth is reached, when the upper end is moored to a buoy. The boat is then rowed away until the entire "dabo line" is paid out, when it is attached to another strong rope also weighted, which is lowered in the same manner as the first, and moored to a buoy. After a time the line is taken up, beginning at the first buoy, when sea-animals of all kinds including many "glass" sponges are found either hooked or entangled in the "snoods."

The order **Tetractinellida** comprises living and fossil forms, the skeletons of which are composed of four-rayed spicules.

The fossil Tetractinellids and other sponges are well shown in the Geological Hall, fourth floor, north wing of this building. *Hyalotrogos*, *Cnemidiastrum*, *Leidorella* and *Callopegma* are a few of the genera illustrated by the specimens.

The next great division of sponges, the order **Monaxonida,** comprises sponges having large spicules of but one axis. Sometimes these are arranged in radiating bundles and sometimes form a network. The species are quite numerous and universally distributed. The most remarkable of these sponges are the giant Neptune's Goblets (*Poterion neptuni* Harting), three fine specimens of which may be seen in a special case at the farther end of the alcove. At the left of these, another large cup-like Monaxonid sponge fished up near Santa Lucia, West Indies, may also be seen. This specimen (see opposite page) is remarkable for its size and beauty, for the peculiar irregular knob-like

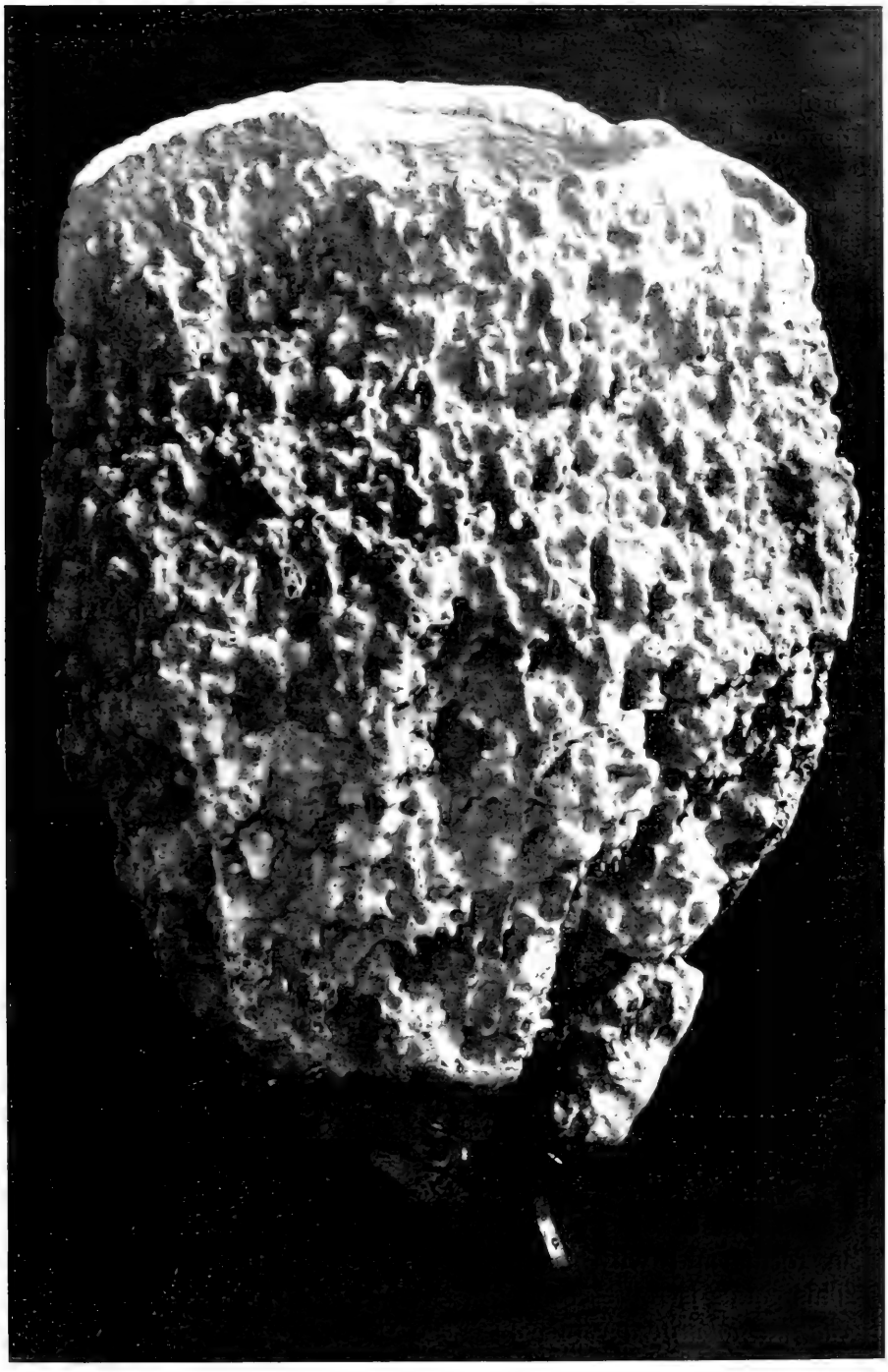


FIG. 23.—A REMARKABLE VASE-LIKE MONAXONID SPONGE
From Santa Lucia, W. I. (Height 31½ inches).

projections on its surface, and for its very fragile texture. Other noteworthy specimens belonging to this order are as follows:

Spongilla sp. (illustrated on page 231.)—This is an example of the fresh-water sponges which form the only exception to the rule that sponges are marine animals. In color it is usually yellowish, often tinged with green or brown. It is universally distributed in streams and ponds.

Pachychalina.—This genus consists of usually elongate, finger-like and branching sponges in which the spicules are buried in a horny coating of spongin. The numerous excretory openings, or oscula, are conspicuously scattered over the external surface.

FIG. 24—THE STOLON-BEARING SPONGE (*Siphonochalina stolonifera* Whitfield)
A peculiar adaptation of the branching habit.

Siphonochalina.—This is closely related to the preceding genus, but consists of a group of tube-like individuals varying in form, and with spongin of somewhat paper-like texture. This genus is represented by several species, of which *Siphonochalina stolonifera* Whitfield is the most remarkable. This beautiful sponge is illustrated in the above cut of the type specimen. It consists of a number of tubes with crown-like summits, growing

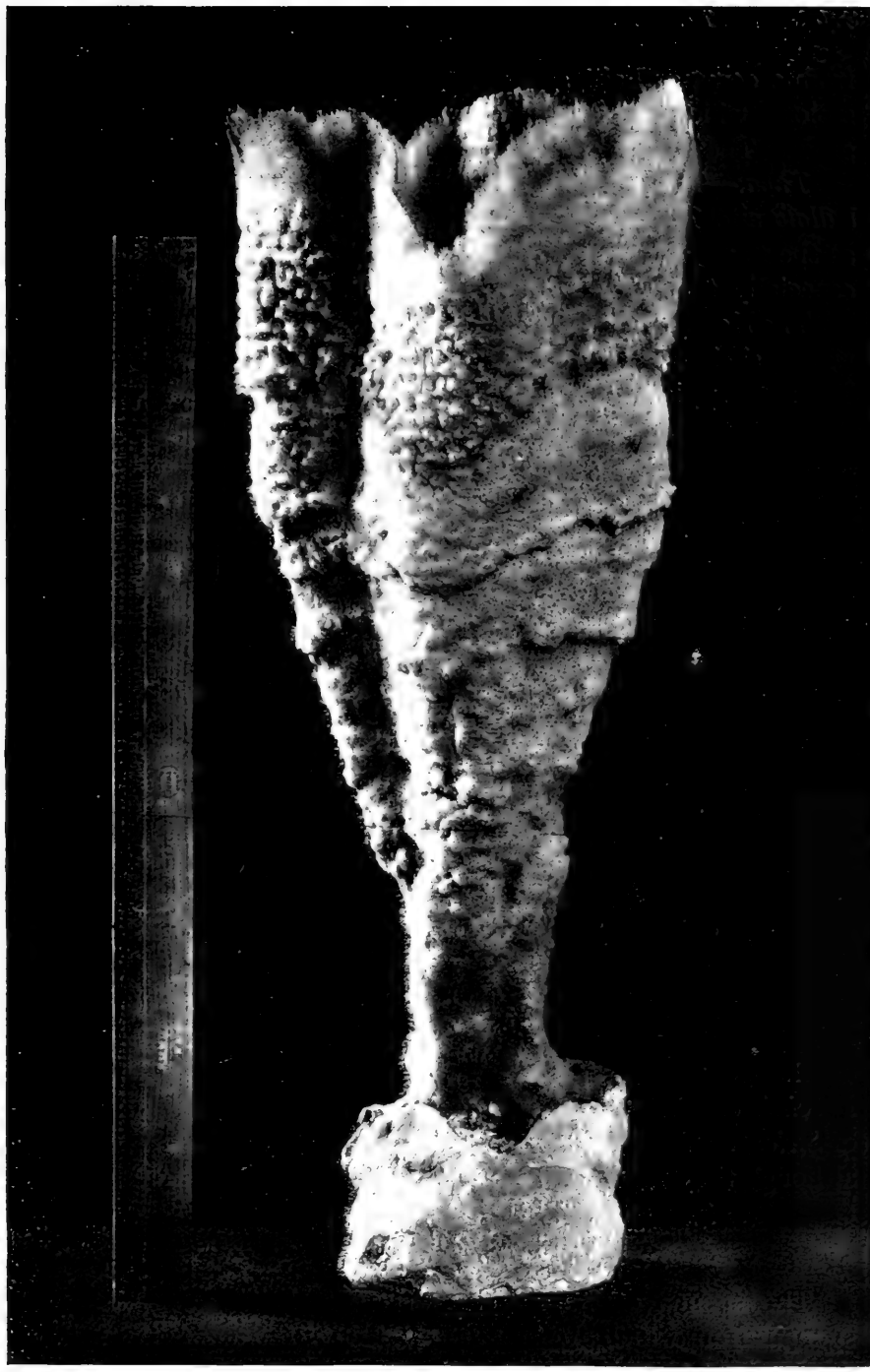


FIG. 25.—THE TRUMPET SPONGE (*Tuba plicifera* Hyatt.)

from a common base, and connected with each other by root-like stolons, which form the attachments to the rocks on which they grow. The texture of the skeleton is very fine and smooth.

Tuba.—The genus *Tuba* is represented by two species *T. bullata* and *T. plicifera.* These are more or less trumpet-shaped as the name implies. The specimen illustrated on page 245 is especially fine.

The Horny Sponges (order **Monoceratida**) includes the sponges whose skeletons are entirely made of the spongin substance. The most typical and most important of these are the commercial

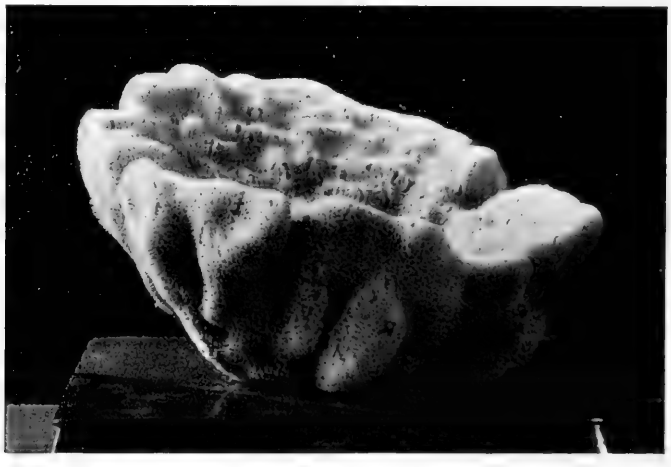
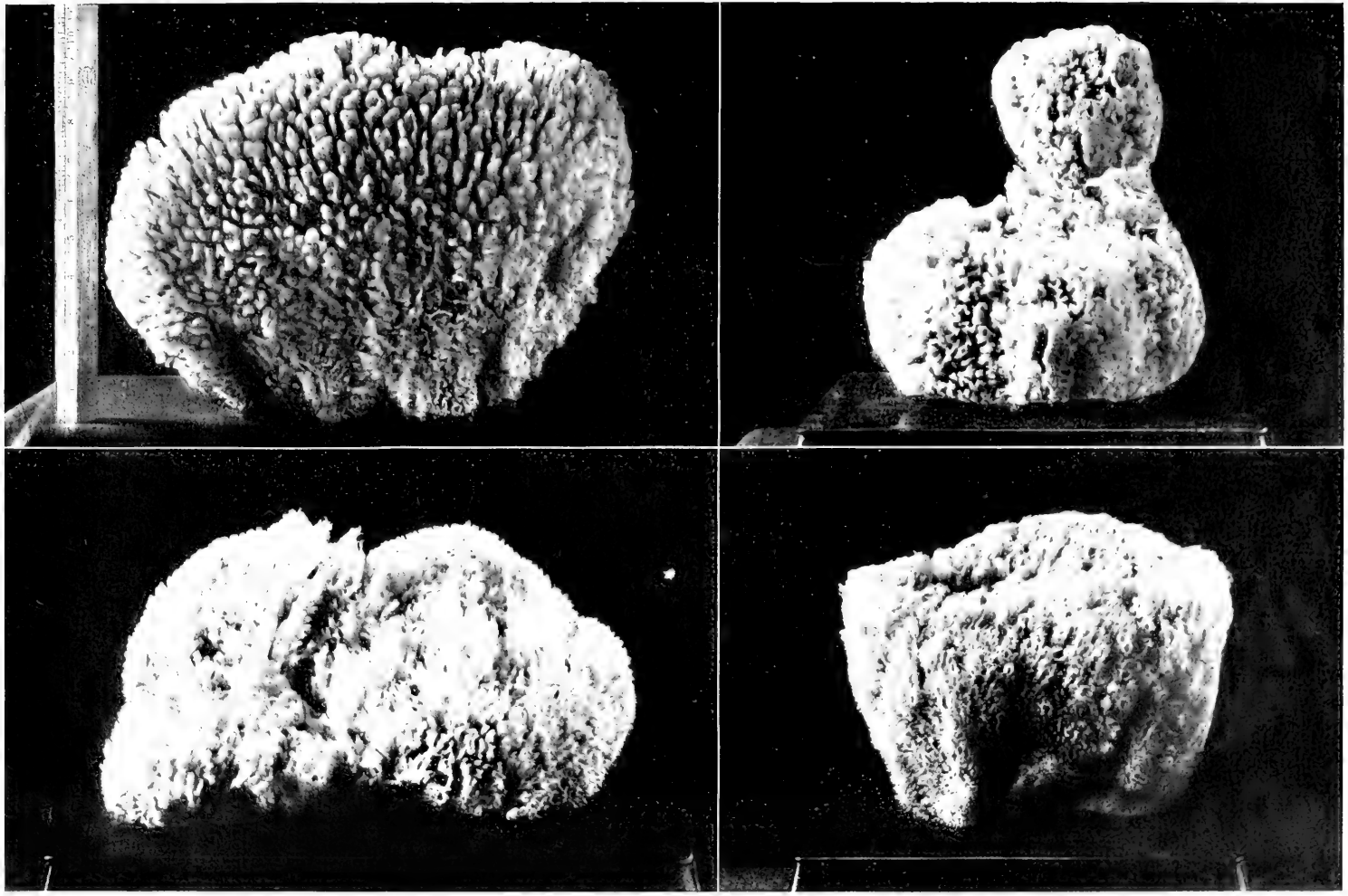


FIG. 26.—THE ZIMOCCA SPONGE (*Euspongia zimocca* Schulze)

sponges. They are divided into the genera *Euspongia* and *Hippospongia.* In addition to these the fine finger-like sponges of the genus *Chalinopsilla*, the black branching skeleton of *Hircinia atra* Whitfield (type) and the graceful cup-like specimens of *Stelospongia* (see illustration on page 227) are worthy of note, although they possess no commercial value.

THE COMMERCIAL SPONGES.

The sponge of commerce is the elastic horny skeleton of spongin from which all the living tissues of the animal have been removed. The principal sources of supply are:



FIGS. 27-30 FOUR GRADES OF AMERICAN COMMERCIAL SPONGES[1]

FIG. 27.—The "Velvet" Sponge (*Hippospongia meandriform* D. & M.).

FIG. 28.—The Florida Yellow Sponge (*Euspongia corticata* D. & M.).

(1) The Mediterranean coast, including the gulfs, bays and islands from Italy to the Levant, and the whole African shore.
(2) The Bahamas, Florida, and the north coast of Cuba.
(3) Australia and a few of the Pacific Islands.

There are three grades of European sponges, *i. e.*, the Turkey or Levant Sponge, the Horse Sponge, and the Zimocca Sponge.

FIG. 31.—THE SYRIAN SILK SPONGE (*Euspongia officinalis* var. *mediterranea* Schum.)
The finest quality of Mediterranean sponge.

The Turkey or Levant Sponge (*Euspongia officinalis* var. *mediterranea* Schum.) is shown in the illustration. It is the finest grade of sponge known. Its texture is very soft, fine and silky. On account of the latter quality it is often called the Syrian Silk Sponge. This same species grows in Florida but is of very poor quality, probably on account of the climate and other differences in its surroundings.

The next grade of Mediterranean Sponge is the Horse Sponge (*Hippospongia equina* O. S.). Its quality is very fine and is paralleled on the Florida coast and in the Bahamas by the Velvet

and Sheep's-wool Sponges (*Hippospongia meandriformis* D. & M. and *H. gossypina* Hyatt). These are the best of American bath-sponges. (Figs. 27 and 29)

The third grade, the Zimocca Sponge (*Euspongia zimocca* F. E. Schulze), is not as soft as the others, and corresponds to the Florida Yellow Sponge or "Hardhead." (Figs. 26 and 28).

The Grass Sponge (*Euspongia graminea* Hyatt. Fig. 30) is the poorest grade of American sponge and is of little commercial value.

Sponges grow attached to rocks and other objects at the sea-bottom. They are obtained in shallow water by means of long iron hooks, which, however, often damage the sponges by tearing them. The most perfect specimens as well as the largest are obtained at greater depths by divers. The Dalmatian fishermen are very skilful at this. The diver is stripped and has a small rope attached to his waist weighted with a slab of stone. He seizes the stone in his hands and dives to the bottom. A skilful diver can remain under water for two to three minutes, during which time he quickly gathers whatever sponges he can find and places them in a net attached to his neck. He is then quickly drawn to the surface. Diving by this method is confined to the summer season, as the winters are too cold for such work. The Greek divers use a water-glass to locate their sponges. This is a metal cylinder somewhat longer than a band-box, open at the top and closed at the bottom by a plate of glass. By holding the glass-covered end below water, a person looking through it can easily see the bottom at a depth of 180 feet. The divers work in regulation diving-suits supplied with air from above. Under these circumstances they can remain below for a length of time varying from an hour to a few minutes, depending on the depth at which they are working. The best sponges are obtained in this way, as they are more perfect and of larger size in deep water, and can be removed from the rocks with greater care.

Dredging is also practised off the coast of Asia Minor.

Sponges are prepared for the market by first exposing them to the air until the animal matter begins to decay. They are then washed, either by beating, by treading them with the feet,

or by exposing them to the action of the waves in so-called "crawls" or pens, until the skeletons are entirely freed of animal matter. They are then hung up to dry, baled, and sent to the market. Sometimes sponges are more quickly prepared by being bleached with chemicals. This gives them a very light color but impairs their quality. Sometimes when sold by weight they are adulterated with sand.

Sponge-fishing has been carried on so unwisely and with so little thought for the future, that the supply has been steadily declining in recent years, and lately the governments of the various countries concerned, foreseeing the almost certain destruction of the sponge industry, have attempted to regulate it in various ways and also to increase the supply by artificial propagation.

In Florida and Italy, more or less successful progress has been made, especially in the matter of sponge propagation. This is done in the winter season by choosing uninjured specimens and cutting them up into fine pieces about an inch square, on a board kept moist with sea-water. These "cuttings" are then placed on the ends of sharpened stakes held upright in a weighted wooden framework. This is sunk in a sheltered bay with a rocky bottom, free from mud, and protected from cold currents. If properly treated in this manner sponges will treble their size in a year and will be ready for the market in from five to six years.